

# Hydraulic Analysis for Arlington Motor Inn

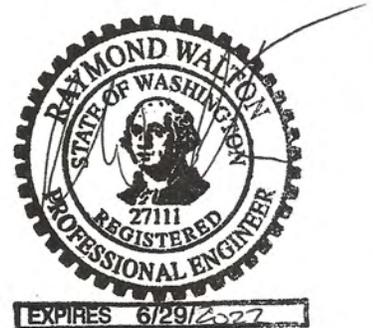


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## 1 EXECUTIVE SUMMARY

This report describes the hydraulic analysis for the proposed grading plan to mitigate the floodplain violation on the Arlington Motor Inn Property, in Arlington, WA. The report evaluates potential floodplain impacts for this project. To assess potential hydraulic impacts to the Stillaguamish River and adjacent tributaries, WEST modified a previously validated HEC-RAS model (WEST, 2017) by updating the cross sections to better represent the existing violation and the proposed grading on-site (grading plane created by Cascade Surveying, 2020). We simulated the 2-, 10-, 25-, 50-, and 100-year recurrence flow events as part of our analysis.

We compared model results at all locations in the model, which includes Upper Portage Creek, Lower Portage Creek, South Slough, and the Stillaguamish River. The model results indicate that the proposed design will cause flood levels for the 25-, 50-, and 100-year flood events to increase at certain cross sections of Portage Creek and South Slough. Additionally, the proposed design will decrease water surface elevations during the 10-year event. No change in water surface elevations during the 2-year event were observed. The hydraulic model also shows that the proposed design will increase the magnitude of the increase is negligible and no meaningful impact is expected, such as change to sediment transport or erosion potential. No discernable change in velocities was observed in any other reach for any of the modeled hydrographs. As proposed, the grading plan on the Arlington Motor Inn property has negligible hydraulic impact on the floodplain in the project area, at the I-5 crossing downstream of the site, or in any of the surrounding reaches.

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## 2 INTRODUCTION

The Arlington Motor Inn proposes to mitigate a floodplain violation in the City of Arlington. **Figure 1** shows the project location. The proposed development is located on approximately 4.7 acres southwest of the State Route (SR) 530 intersection with Interstate-5 (I-5), within a larger area known as Island Crossing. The entirety of the project site lies within the 1-percent-annual-chance floodplain of the Stillaguamish River, also known as the special flood hazard area. A 1-percent-annual-chance flood has a 1-percent chance of being equaled or exceeded in any given year, and it is often called the base flood or 100-year flood. **Figure 2** and **Figure 3** shows the Federal Emergency Management Agency (FEMA) effective flood insurance rate maps (FIRMs) in the study area. The entire Island Crossing area is designated as Zone AE, which means the project is located in a special flood hazard area inundated by the 100-year flood and base flood elevations have been previously determined by FEMA.

At the request of Cascade Surveying and Engineering, Inc., WEST Consultants, Inc. (WEST) performed an initial hydraulic analysis to evaluate potential impacts on water surface elevations and velocities during the 2-, 10-, 25-, 50-, and 100-year flood events. For the initial analysis, we revised the WEST 2017 model by updating the model geometry to better capture the project area, and compared existing conditions with proposed conditions. The initial analysis of the proposed Pilot Travel Center model results indicated that the BFE at the site was higher than the provided BFE of 47.0 feet. Model results indicate the BFE at the site was 48.4 feet, so the site was raised an additional 1.4 feet to account for the difference. These updates are incorporated in the model geometries used for the existing and proposed grading plan for the Arlington Motor Inn grading plan as well.

The model results indicate that the proposed development would: (1) result in no discernable increase to maximum water surface elevations throughout the model domain during any of the modeled hydrographs, and (2) result in slight changes to channel velocities near the project, but no discernable increases throughout the rest of the model domain for any of the modeled hydrographs. However, the magnitude of the increase in velocity is negligible and no meaningful impact is expected, such as change to sediment transport or erosion potential.

As part of the completed hydraulic analysis, WEST verified that the current model maintains the same level of accuracy as previous models, completed an in-depth analysis comparing existing and proposed conditions, completed a climate change sensitivity analysis, and completed a flood impact analysis. The ensuing report describes the model development and application of the existing and proposed conditions models, presents the results, and summarizes the negligible hydraulic impacts caused by the proposed development.

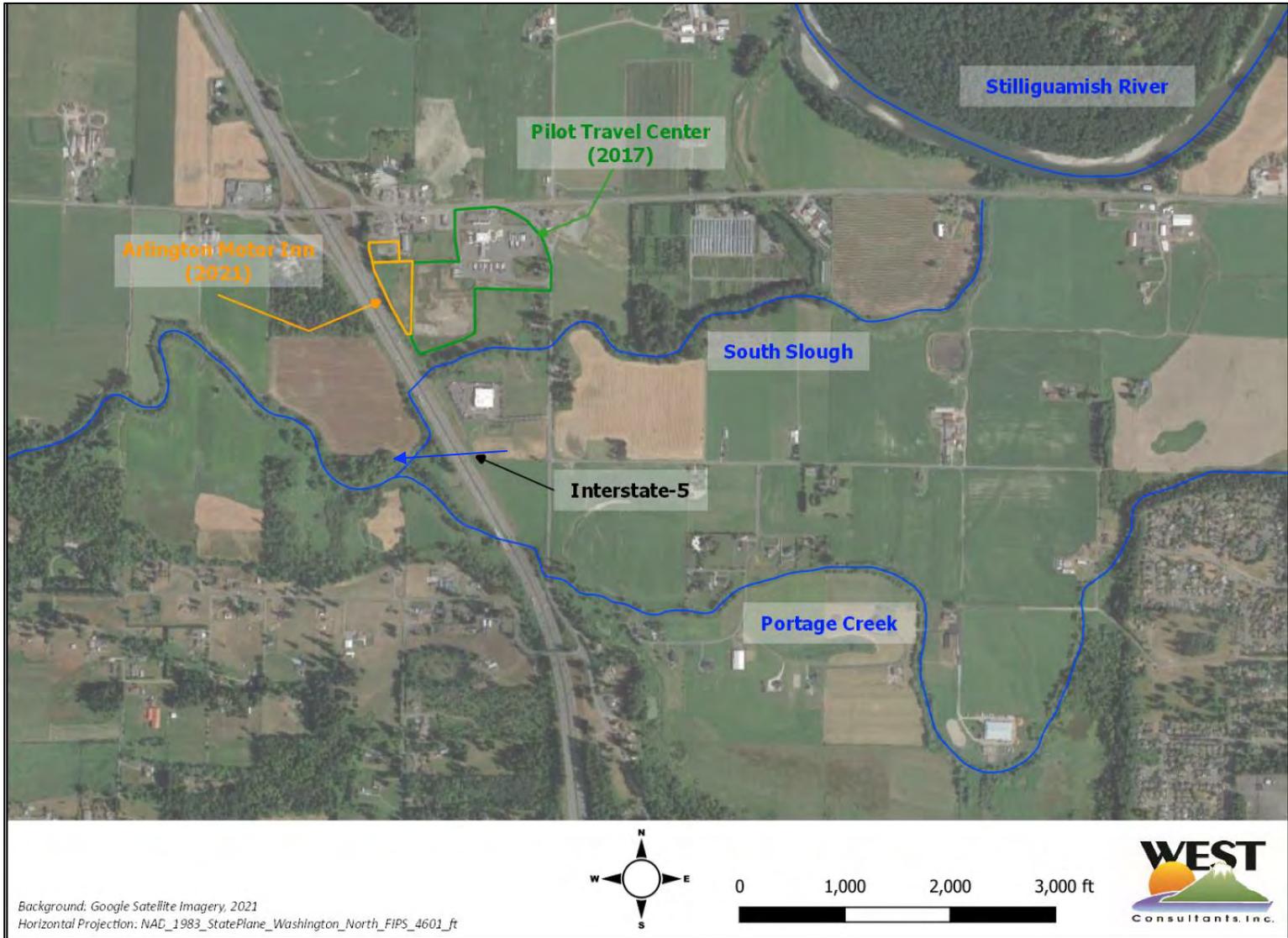
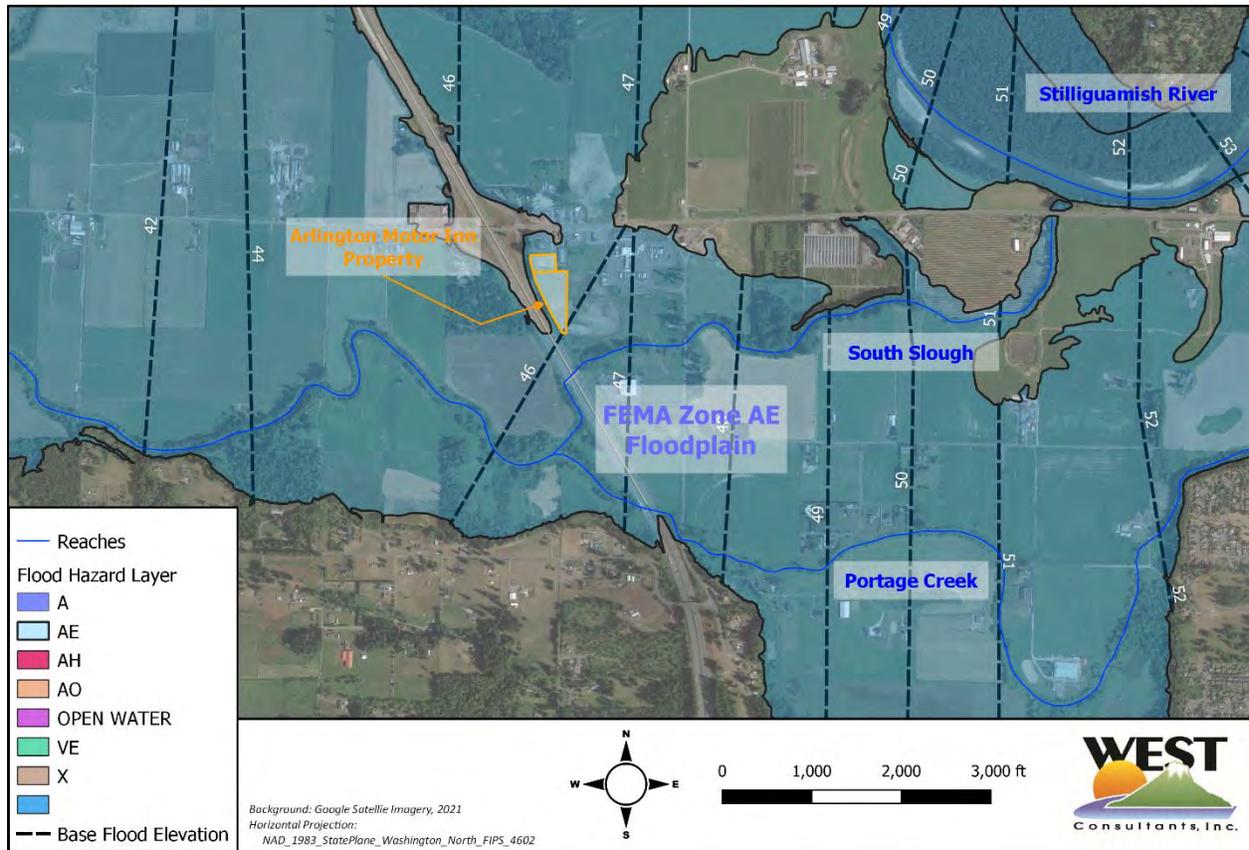


Figure 1. Project location map



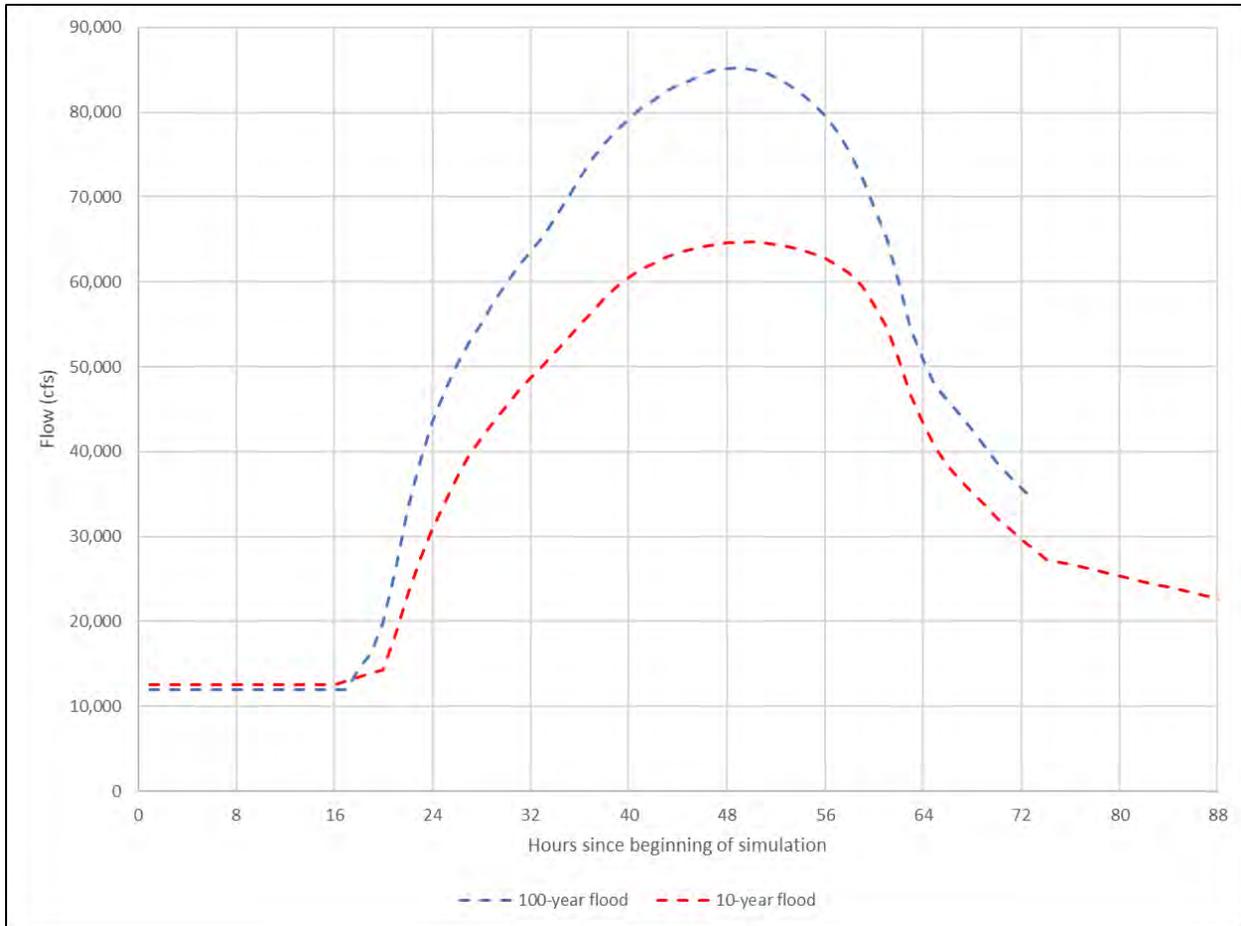


**Figure 3: FEMA Flood Zone AE, with project site overlaid**

### 3 HYDROLOGY

#### 3.1 2-, 10-, 25-, 50-, AND 100-YEAR FLOODS

For the current WEST 2021 study, we used hydrographs for the 2-, 10- 25-, 50-, and 100-year flood events established in the WEST 2013 and 2017 models. The WEST 2013 study used 10- and 100-year flood hydrographs from NHC 2012 study, which were based on the PIE 2003 model. The unsteady flow files for the WEST 2013 study were updated to account for differences between the PIE 2003 and the NHC 2012 geometries. Updates include matching reach and cross section names that vary between models, as well as applying a steady inflow to the added South Slough reach. The 10- and 100-year inflow hydrographs for the WEST 2013 and WEST 2017 models are shown in **Figure 4**. These flows are applied in the model at the upstream end of the Stillaguamish River. Additional detail on the development of the hydrology can be found in the Floodplain Impact Analysis of Dwayne Lane’s Arlington Chevrolet New Dealership report (WEST, 2013).



**Figure 4. 100-yr and 10-yr upstream inflow hydrographs for all WEST Models**

The inflow hydrographs of the Stillaguamish River for the 2-, 25-, and 50-year flood events were scaled from the 10- or 100-year flood hydrograph. **Table 1** shows the scaling factors used to develop the hydrographs, which were originally based on the hydrologic analysis in the 2003 model report (Snohomish County Surface Water Management, 2003). These scaling factors were also used in the WEST 2013, 2017 and 2021 models.

**Table 1. Scaling factor for 2-, 25-, and 50-year floods**

Event	Hydrograph scaled from	Scaling factor
2-year	10-year	0.693
25-year	10-year	1.118
50-year	100-year	0.934

## 4 HYDRAULICS

### 4.1 PREVIOUS HYDRAULIC MODELS

A series of previous existing unsteady flow HEC-RAS hydraulic models of the Stillaguamish River include: (1) a model finalized in 2003 by Pacific International Engineering (PIE) and Snohomish County (Snohomish County Surface Water Management, 2003); a model developed by Northwest Hydraulic Consultants (NHC, 2012) for Snohomish County to support a habitat assessment of the Stillaguamish River downstream of Arlington; a model WEST adapted from the NHC 2012 model to evaluate any potential hydraulic impacts from the Dwayne Lane's Arlington Chevrolet Dealership, hereafter referred to as the WEST 2013 model. Finally, the 2017 WEST model was further adapted from the WEST 2013 model to evaluate potential hydraulic impacts from the Pilot Travel Center Gas Station. The WEST 2013 and 2017 models were both adapted for the 2021 model exercise for the purpose of calibration and validation of the updated geometry. A brief overview of the WEST 2013 and WEST 2017 models are provided below. Because the WEST 2017 model is the most up-to-date model available, and the results and the study report have undergone peer review, we used it as the base of the analysis described in this report.

#### 4.1.1 WEST 2013 MODEL

The WEST 2013 model includes the floodplain of the Stillaguamish River between I-5 and Smokey Point Boulevard and two overflow channels of the Stillaguamish River, South Slough, and Portage Creek. Both South Slough and Portage Creek collect local runoff during times of low flow in the Stillaguamish River, but during floods they carry water that spills overbank from the Stillaguamish River. The NHC 2012 model was used a base for the WEST 2013 model, and was modified in the vicinity of the Island Crossing area as follows:

- A number of additional cross sections were added to increase the resolution of water surface elevations in the Island Crossing area. The geometry of these cross sections was extracted from the 2003/2005 LiDAR data.
- The reach of Thomsen Slough and the inline structure on Thomsen Slough representing I-5 was replaced with two storage areas; "Thom Lower" and "Thom Upper" (**Figure 5**). The associated geometry, including lateral structures, was also edited to reflect these changes.
- The jersey barriers (**Figure 6**) along the center of I-5 were also included in the model. WSDOT installed the barriers between 2009 and 2010. The top elevations of the barriers were surveyed by GFK Consulting, Inc. The small openings, or scuppers, at the bottom of the barriers are represented in the model geometry as a culvert with an area slightly less than the total area of all the openings to account for larger friction losses through individual openings. **Figure 7** shows the representation of the openings in the HEC-RAS geometry.

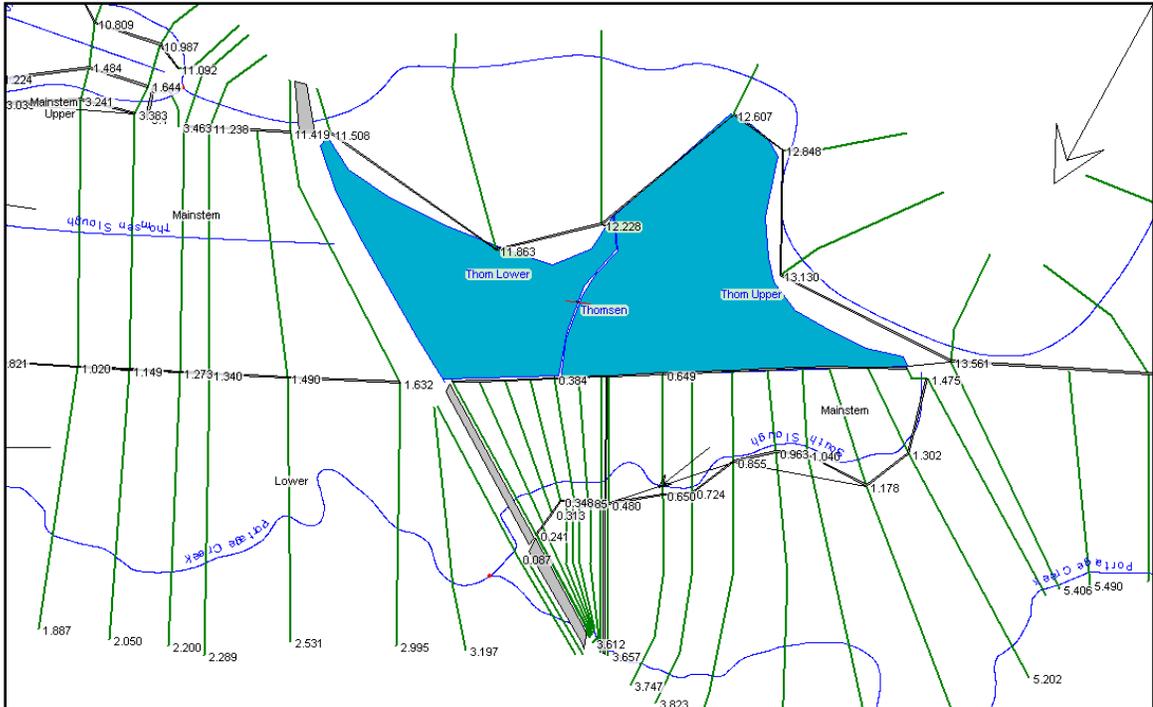


Figure 5. WEST 2013 existing conditions model geometry

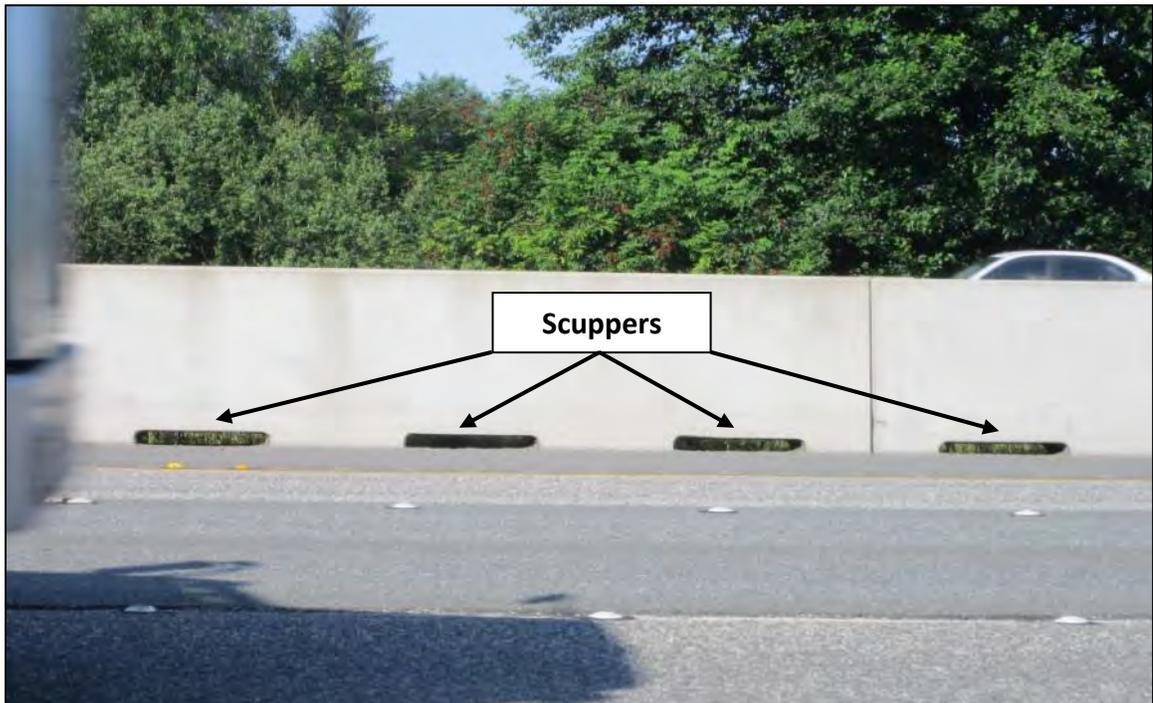
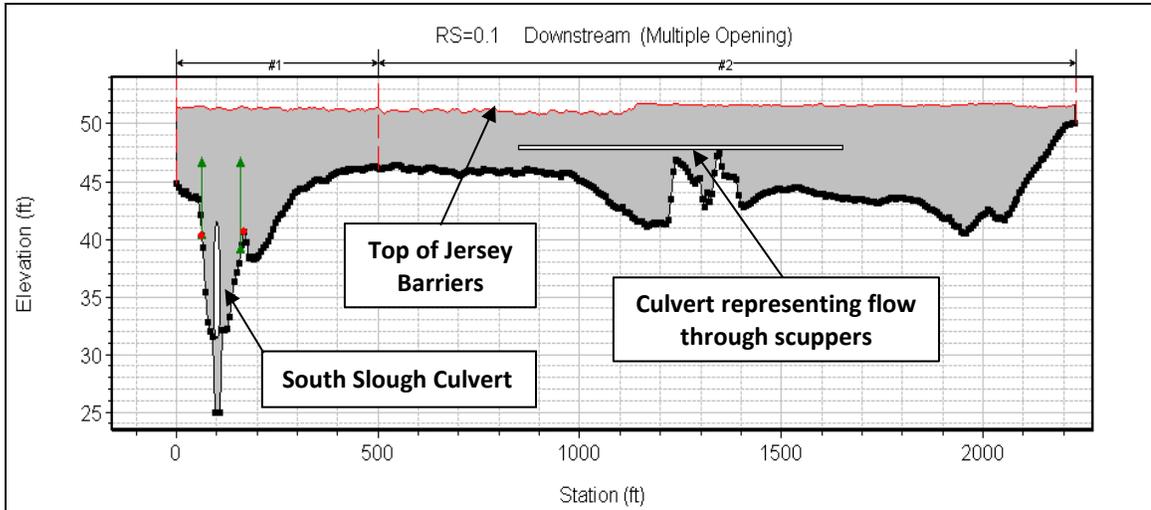


Figure 6. Jersey barriers along I-5



**Figure 7. Representation of I-5 traffic scuppers in HEC-RAS**

- The geometries of the I-5 South Slough culvert and the I-5 Portage Creek bridge were updated based on the new survey data provided by GFK Consulting, Inc.
- The lateral structures between South Slough and Portage Creek were updated in the Island Crossing area based on 2003/2005 LiDAR.

#### 4.1.2 WEST 2017 MODEL

To develop the WEST 2017 existing conditions model geometry, we used the final WEST 2013 proposed model geometry as a basis for updating. Updates were in the vicinity of the South Slough and Portage Creek reaches. In the WEST 2017 existing conditions and proposed conditions models, the geometry in the South Slough reach from cross section (XS) 0.458 to XS 0.240 was refined to better capture hydraulic processes in and around the proposed Pilot Travel Center. Geometry updates included adding several cross sections, ineffective flow areas, reorienting several existing cross sections, and updating the lateral structure connections to reflect the new cross sections added in the reach. **Figure 8** shows the 2017 cross section orientation, with the proposed grading plan for the Pilot Travel Center laid underneath the cross sections. WEST then recut new cross sections using available LiDAR data. Particular modifications were as follows:

- A total of 11 cross sections, including and between XS 0.458 and XS 0.244, were added or altered based on the proposed grading plan for the Pilot Travel Center.
- Data within the lateral structures to the north and south of these cross sections were updated to incorporate the new additional cross sections, as well as the change in distances between these cross sections.
- The previous additions from the WEST 2013 model, discussed in Section 4.1.1, were kept in place as part of the updated “existing” conditions model geometry.



**Figure 8: Geometry orientation for the WEST 2017 models. Terrain is underlain to show reasoning for cross section placement in vicinity.**

## 4.2 2021 PRE-EXISTING AND EXISTING MODELS

Because the WEST 2021 existing conditions model is more refined near the Arlington Motor Inn project area compared to the WEST 2013 and WEST 2017 models, our 2021 model needed to be verified. This was done through comparisons between the WEST 2013 existing conditions model results with the WEST 2021 pre-existing conditions model results. The following sections describe the model validation at pre-existing conditions, which represents field conditions prior to the construction of the Dwayne Lane Chevrolet Dealership in the Portage Creek reach.

### 4.2.1 2021 PRE-EXISTING CONDITIONS MODEL GEOMETRY VALIDATION

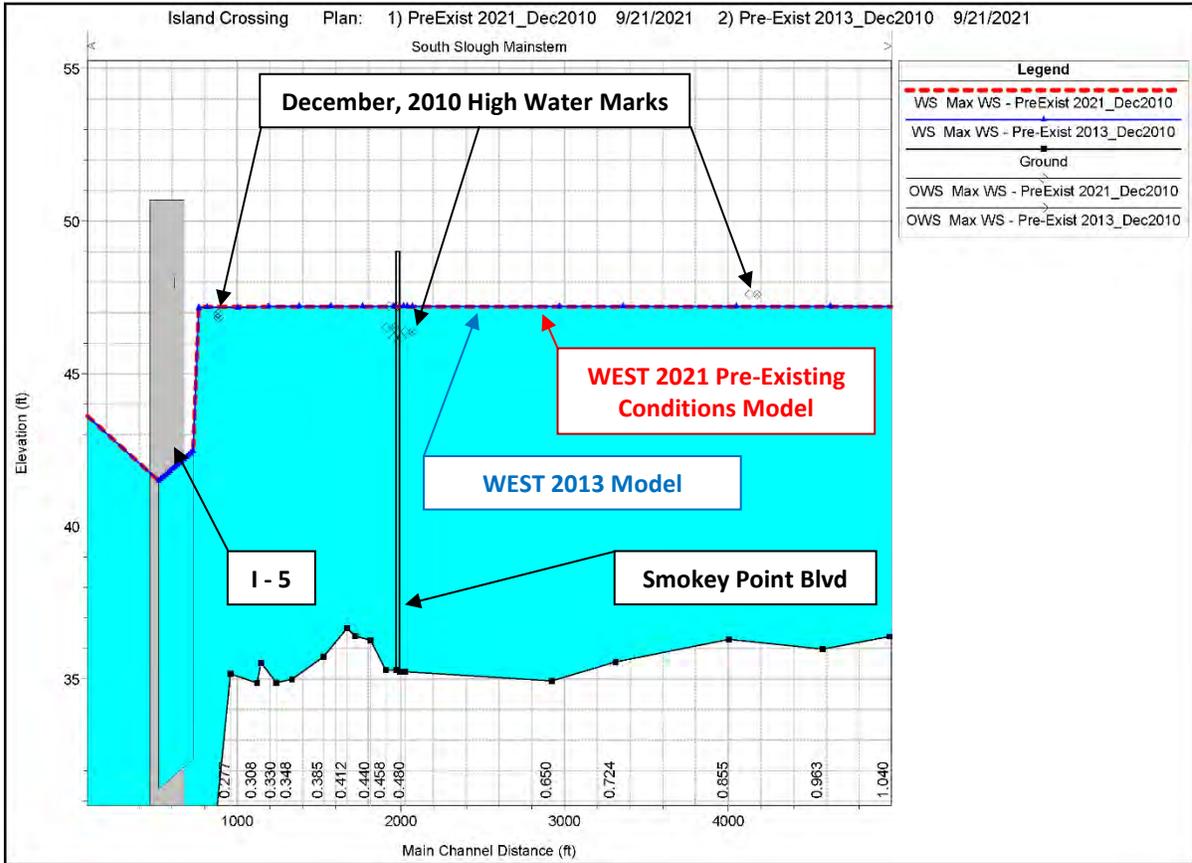
The WEST 2021 pre-existing conditions model uses the refined geometry orientation in the South Slough reach, but reverts to pre-Chevrolet Dealership conditions in the South Slough

and Portage Creek reaches (**Figure 9**) for the purposes of model validation. Cross section elevation data are based on the 2003/2005 LiDAR in the South Slough. In all other reaches, cross section and lateral structure configuration remain identical to the WEST 2013 existing conditions model geometry (pre-Chevrolet Dealership in Portage Creek). We validated pre-existing conditions using the December 2010 event by comparing model results against the previously validated WEST 2013 existing conditions model and high-water marks.



**Figure 9. 2021 Pre-Existing condition model geometry north of the South Slough**

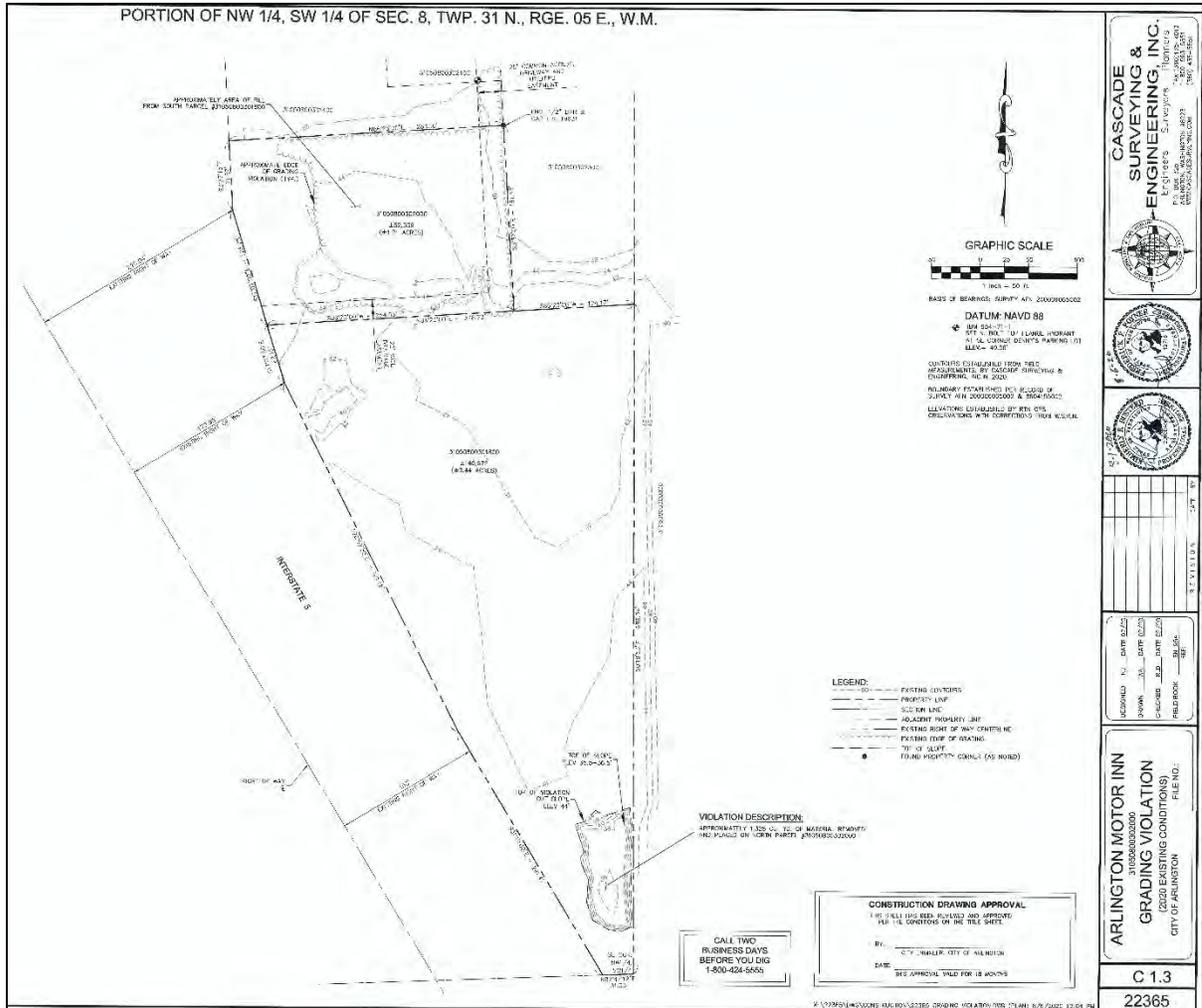
**Figure 10** shows the model results for the pre-existing condition during the December 2010 event along the South Slough. For comparison, the simulated maximum water surface profile from the WEST 2013 model is also shown. Because results from the WEST 2021 pre-existing model are less than 0.02 ft different from the previously validated WEST 2013 model, we consider the WEST 2021 model to also be validated.



**Figure 10. Maximum water surface elevations along South Slough for December 2010 event**

#### 4.2.2 2021 EXISTING CONDITIONS MODEL REPRESENTATION

To develop the WEST 2021 existing conditions model geometry, we used the final WEST 2017 proposed model geometry, which includes Dwayne Lane’s Chevrolet Dealership and the Pilot Travel Center - both based on As-Built drawings - in the South Slough and Portage Creek reaches as a starting point. In the WEST 2021 existing conditions model, the geometry in the South Slough reach from cross section (XS) 0.2405 to XS 0.240 was further refined to better capture hydraulic processes in and around the Arlington Motor Inn property, with particular attention being paid to the area in the southern tip of the property where the floodplain violation exists, as well as the orientation of the proposed grading plan. The validated cross sections were updated with contour data provided by Cascade Surveying (**Figure 11**). Survey data were transformed into a usable terrain in RAS Mapper by WEST. Geometry updates included adding several cross sections, ineffective flow areas, and updating the lateral structure connections to reflect the new cross sections added in the reach. We then recut the new cross sections using 2017 LiDAR and the surveyed area on the Arlington Motor Inn Property. The WEST 2021 existing conditions geometry represents current field conditions (**Figure 12**).



**Figure 11: Contour data derived from survey conducted by Cascade Surveying. This represents the existing (violation) conditions within the Arlington Motor Inn property. A full plan set is in Appendix B.**

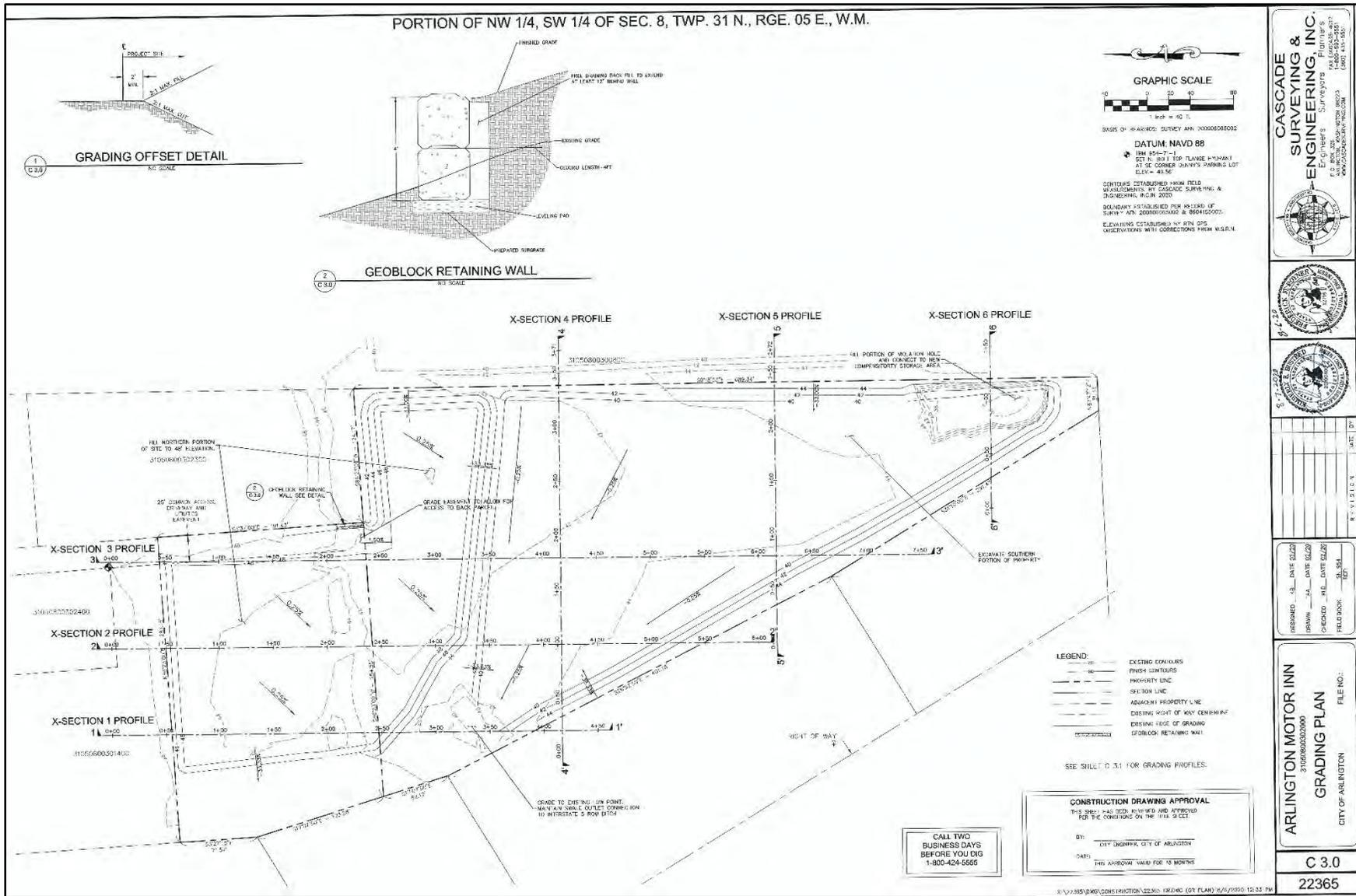


Figure 12. Existing (violation) conditions north of the South Slough reach.

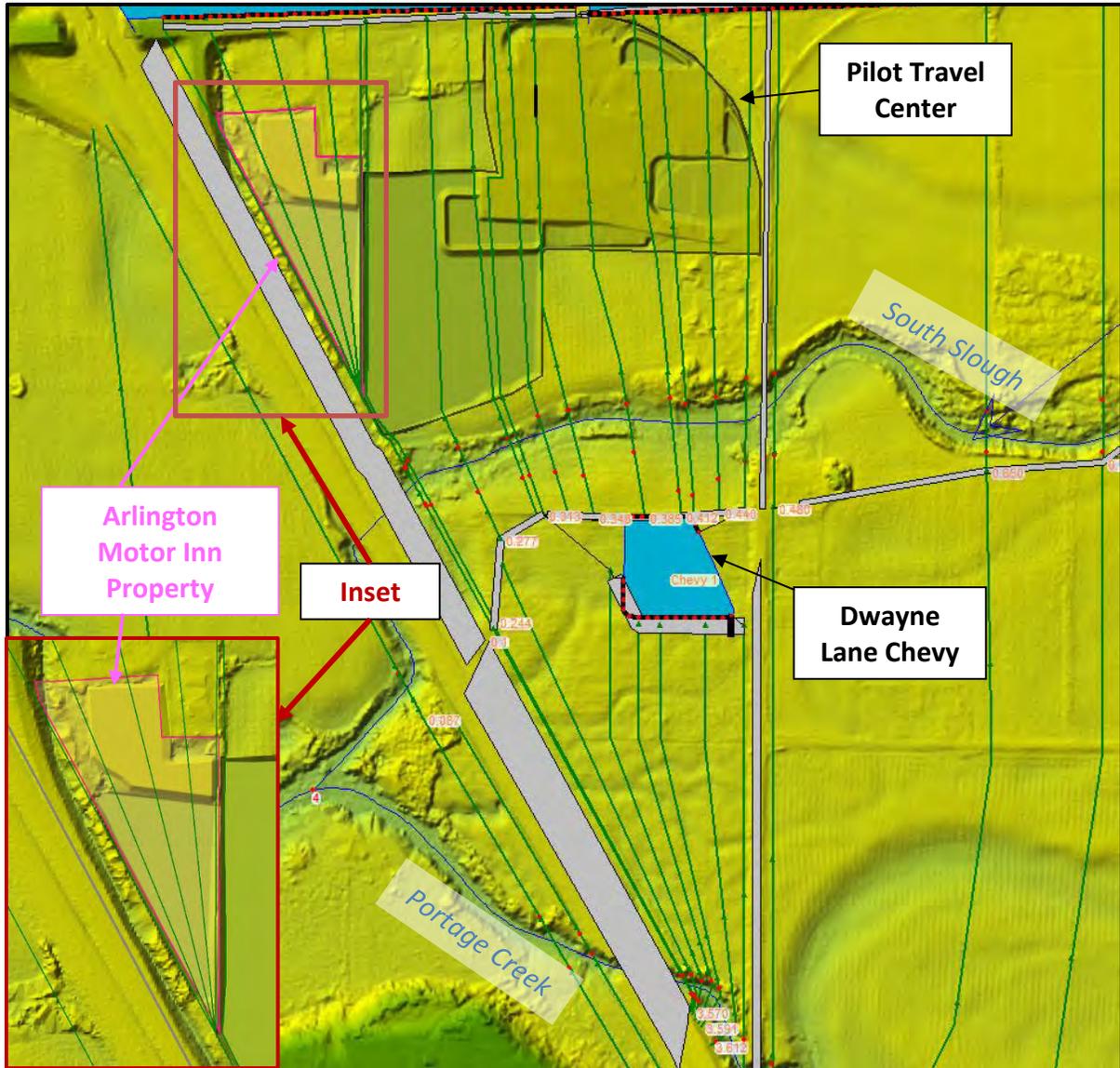
### 4.3 2021 POST VIOLATION CONDITIONS MODEL

#### 4.3.1 2021 MODEL REPRESENTATION

Cascade Surveying and Engineering also provided WEST with contours of the proposed grading to mitigate the floodplain violation within the Arlington Motor Inn property (**Figure 13**, full plan set can be found in **Appendix A**). WEST created and exported a ground elevation surface based on the contours from these drawings. Using RASMapper, WEST overlaid the proposed surface on top of the 2017 LiDAR data (including the Pilot Travel Center) and updated the revised existing conditions geometry in the WEST 2021 model geometry (**Figure 14**).



**Figure 13: Proposed site grading plan to mitigation floodplain violation. Existing contours also on plan page, as dashed line.**

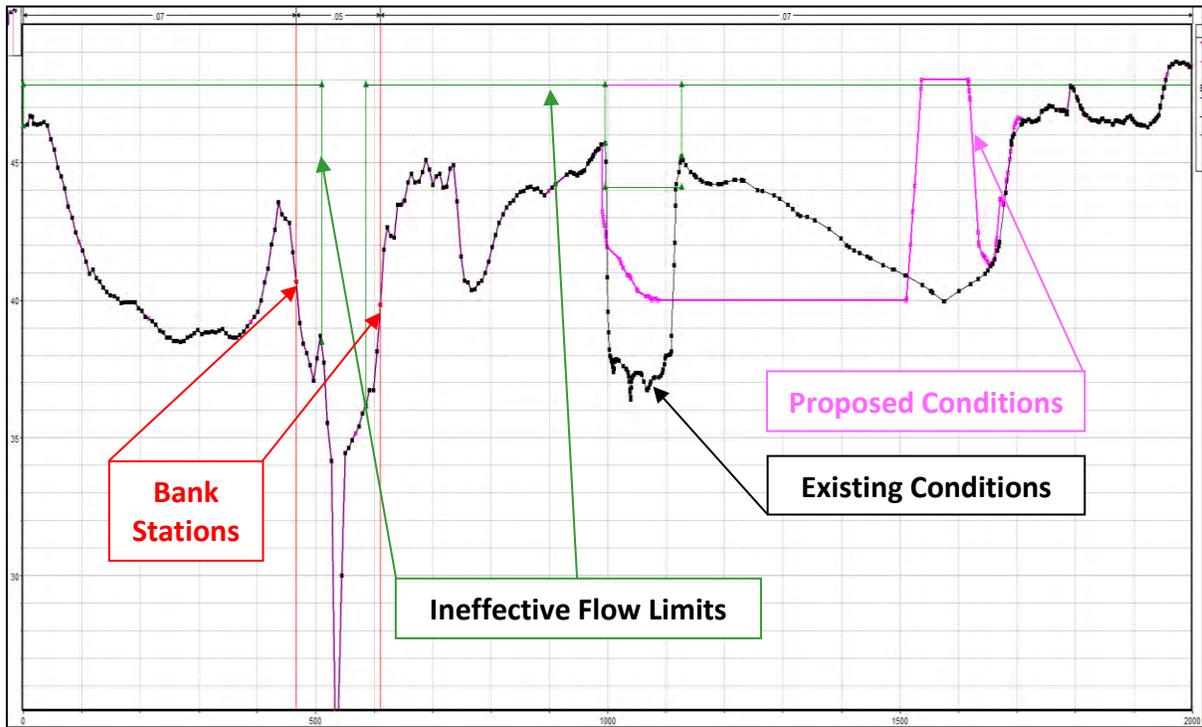


**Figure 14. Post violation conditions model geometry in South Slough and Portage Creek, Inset is a zoomed-in representation of the violation on the property.**

For the proposed, post-violation conditions, WEST updated the cross-section geometry in the South Slough Mainstem reach from cross section (XS) 0.244 to XS 0.2400 to capture both the mitigation conditions in the project area.

The southern three quarters of the wedge-shaped property (~3.4 acres) has a mean bottom elevation of 40.0 ft and has a raised elevation around the edges that goes up to 44.0 ft, which creates a compensatory storage area. The violation area, at the southern tip of the property, is filled to the bottom of the storage area elevation of 40.0 ft. The top one quarter of the property's proposed grading plan (~1.2 acres) is raised, with a maximum elevation of 48.0 ft (Figure 13).

The compensatory storage area may increase conveyance at high flows in South Slough, which may help mitigate potential increases to flood elevations. The footprint of the compensatory storage area is approximately 3.4 acres. In the model, the compensatory storage area is represented in the cross-section geometry. Because the compensatory storage area will not convey flow over its entire depth, a permanent ineffective flow area is applied at an elevation based on the adjacent terrain in a fashion similar to the 2017 model of the Pilot Travel Center.

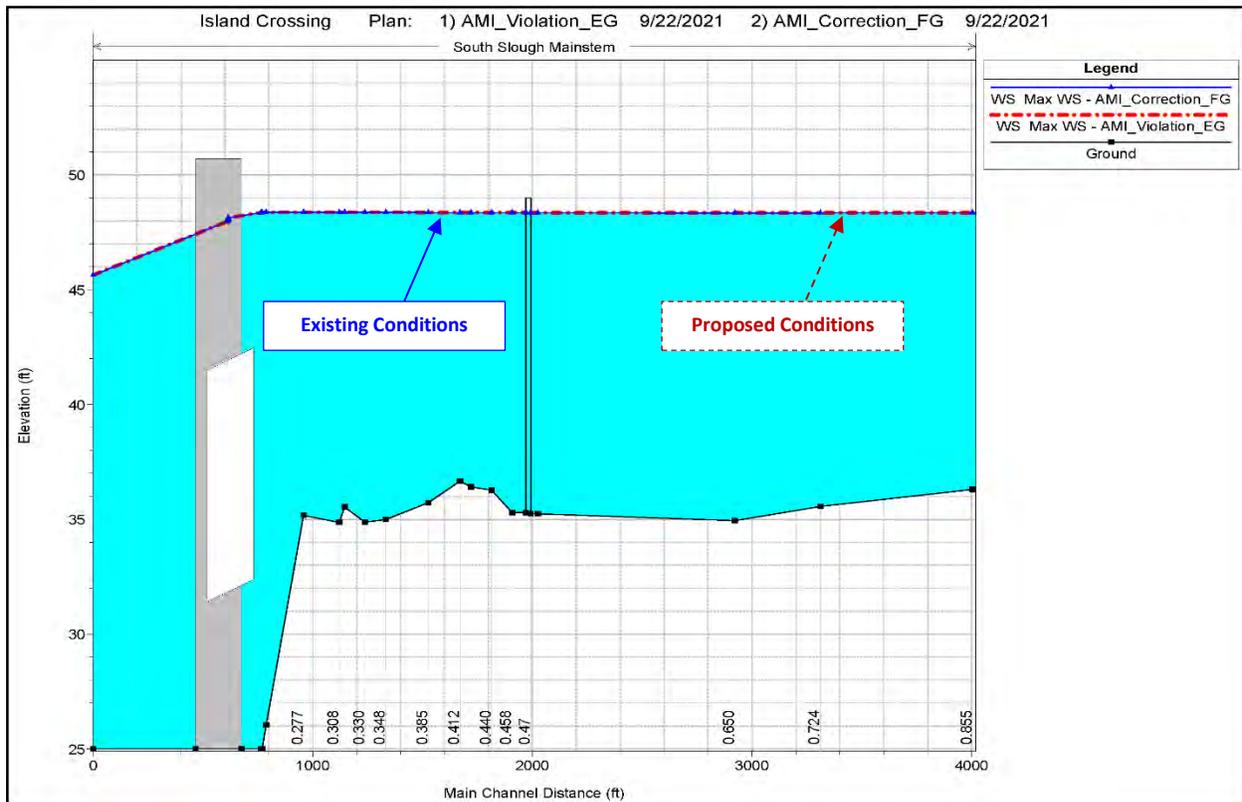


**Figure 15. Representative comparison of existing and proposed conditions at XS 0.2404**

#### 4.4 RESULTS

For this analysis, WEST compared water surface elevations and velocities in all river reaches in the model, however the South Slough reach encompasses the project site and Upper Portage Creek reach is adjacent. Therefore, these two reaches are affected more by the proposed site than other reaches. **Figure 16** shows the simulated maximum water surface profiles along the South Slough for the 100-year flood event. Note that there is no discernable difference between the violation and post violation water surface profile line. This result is sensible due to the location the Arlington Motor Inn property with respect to both I-5 and the culvert that allows the South Slough to cross under I-5. The ineffective flow areas in upstream cross sections that are placed due to the culverts ineffective area prism completely cover the Arlington Motor Inn property; meaning water surface elevation changes due to changes in terrain are relatively insensitive. **Table 2** shows the largest increase in the maximum water surface elevations along South Slough and Upper Portage Creek. The model results indicate that the maximum change in

the BFEs (100-yr WSELs) along all the reaches is 0.00 feet (to two decimal places). A summary of the HEC-RAS model outputs and comparisons can be found in **Appendix A**.



**Figure 16. Comparison of 100-year water surface elevations through the violation and proposed grading geometries, along the South Slough**

**Table 2. Maximum increase in 100-year water surface elevations between existing and proposed conditions for nearest reaches to project site**

River / Reach	Maximum increase in water surface elevations (ft, mitigation – violation conditions)
Portage Creek / Upper	0.00
South Slough	0.00

**Table 3** shows a summary of the maximum water surface elevations at the project site in South Slough, from a representative cross section (XS 0.2403), for the 2-, 10-, 25-, 50-, and 100-year flood events.

**Table 3. Water surface elevations at the Arlington Motor Inn Project Site, XS 0.2403**

Event	South Slough (XS 0.2403)		
	Violation (ft)	Mitigation (ft)	Difference (ft)
2-year	37.496	37.549	+0.053
10-year	41.237	41.232	-0.005
25-year	45.725	45.725	0.000
50-year	47.572	47.572	0.000
100-year	48.364	48.364	0.000

**Table 4** shows a summary of model results surrounding the I-5 culvert in South Slough. Comparing maximum water surface elevations and velocities at two cross sections immediately upstream of the culvert and two cross-sections immediately downstream of the culvert during the 100-year event for the violation and mitigation models shows no change to the water surface elevation, and no change to the velocities. These model results show no hydraulic impact to the I-5 culvert, to the I-5 scuppers, or to the right-of-way in South Slough.

**Table 4. Summary of results at I-5 culvert in South Slough during 100-year event**

River Sta.	Violation		Mitigation		Difference	
	Max Water Surface Elevation (ft)	Max Channel Velocity (ft/s)	Max Water Surface Elevation (ft)	Max Channel Velocity (ft/s)	Max Water Surface Elevation (ft)	Max Channel Velocity (ft/s)
0.2405	48.372	0.185	48.372	0.185	0.000	0.000
0.240	48.362	1.188	48.362	1.188	0.000	0.000
0.1	Culvert	Culvert	Culvert	Culvert	Culvert	Culvert
0.087	45.635	1.234	45.635	1.234	0.000	0.000
0.086	45.639	1.133	45.639	1.133	0.000	0.000

Model results show a negligible change to both main channel and overbank mean velocities. **Table 5** summarizes the maximum increases in channel velocities in the South Slough and Upper Portage Creek reaches. **Appendix A** contains existing and proposed conditions velocities for each cross section in the model and the differences between the two. In general, the proposed site increases conveyance over the compensatory storage compared to existing conditions, and the additional conveyance provides more cross-sectional area for flow to convey downstream, although this increase is small. This results in a very slight decrease in velocities in cross sections that represent the compensatory storage area (XS 0.2045 to XS 0.240). Conversely, the fill from the proposed project site decreases the cross-sectional area, which has an opposite effect on mean overbank velocities. The net influence on velocities due to the proposed site grading plan is negligible.

**Table 5. Maximum increase in channel velocity between the existing violation and proposed grading conditions through the South Slough reach.**

Event	South Slough Reach
	<i>Difference (ft/s, (mitigation - violation)</i>
2-year	+0.057
10-year	+0.001
25-year	0.000
50-year	0.000
100-year	+0.010

During smaller flood events, such as the 2-, 10-, and 25-year events, overbank flow from the Stillaguamish River travels down the South Slough reach to the project site. The overbank areas of South Slough and Upper Portage Creek are not activated during the 2-year event and no change in velocity is observed, while flow events larger than the 10-year actively use the overbanks. As a result, we observe that velocities increase near the project site by less than 0.01ft/s and propagate up the South Slough and increases by a maximum of 0.057 ft/s during the 2-year event. In general, these changes in velocities observed here effectively negligible.

Alternatively, during larger flood events, such as the 50- and 100-year events, overbank flow from the north begins to overtop SR 530 into the project area. This additional source of overbank flow to the South Slough reach, combined with the flow constriction at the I-5 crossing, creates a backwater effect in the South Slough reach and we observe negative velocities coincident with the maximum water surface elevation in several cross sections. A sign of the velocity value, positive or negative, indicates the direction in which flow is oriented relative to the cross section. In our model, a positive value represents flow moving downstream and a negative value is flow moving upstream. Changes in velocities and water surface elevations due to the Arlington Motor Inn project don't propagate upstream beyond XS 0.277.

Maximum velocities near the Arlington Motor Inn property under the existing violation and proposed grading conditions are much lower than permissible velocities—defined as the maximum allowable velocities for a streambed material or vegetation type to remain stable—for the vegetation type in the South Slough reach. WEST performed a site visit in 2017 and noted the vegetation cover in the overbank and main channel areas in the South Slough (see **Figure 17**). In the South Slough, the overbank vegetation is comprised of short grasses, while the main channel of the South Slough consists of long grasses, shrubs, and several younger trees. Aerial imagery analysis of the site since 2017 provided no reason to change these assumptions. *Stability Thresholds for Stream Restoration Materials* compiles and compares several reference sources for permissible velocities for selected stream lining materials and suggests a range of permissible velocities for short native and bunch grass as 3.00 ft/s to 4.00 ft/s and 4.00 ft/s to 6.00 ft/s for long native grasses (Fischenich, 2001). Additionally, the King County Surface Water Design Manual specifies a maximum velocity of 5.00 ft/s for grass lining material (2009).



**Figure 17: Right overbank looking downstream at the Pilot Travel center project site, before construction (left) and Slough Slough main channel looking upstream (right). Images were taken in 2017.**

No cross sections within the vicinity of the Arlington Motor Inn property, during any flow event, results in an exceedance of the smallest “permissible” velocity of 3.00 ft/s; the lowest of the velocities cited. The maximum velocity modeled was at XS 0.087, downstream of the I-5 culvert. Velocities there were 1.23 ft/s for both violation and mitigation model runs, this is 41% of the lowest permissible velocity that might be assumed as reasonable given the site conditions.

**5 CLIMATE CHANGE SENSITIVITY ANALYSIS**

To address concerns that the proposed site may cause significant impacts during higher peak flows as a results of climate change, WEST completed a climate change sensitivity analysis to consider any hydraulic impacts from the proposed development of the Pilot Travel Center in 2017. WEST used the same analysis for the 2021 WEST models. WEST based its climate change analysis on *Incorporating Climate Change into the Design of Water Crossing Structures* (WDFW, 2016). Using the methodology described in the WDFW Climate Change report (2016), WEST used results from the ten different climate change models to perform a weighted average that determines the percent change in the 100-year flow due to climate change. For the Stillaguamish River basin, **Table 6** shows a summary of the ten model results.

**Table 6. Climate change model results for the Stillaguamish Basin, originally developed for the 2017 Pilot Travel Center Project, and adopted for this project as well.**

Model	% Change in flow
ccsm3_20_1	-1.07
cnrm_209_1	32.69
echam5_2_2	5.53
echo_209_1	-0.56
hadcm_20_2	-1.94
hadgem1__3	19.64

Model	% Change in flow
ipsl_209_1	19.58
miroc_20_2	56.58
pcm1_209_1	6.98
cgcm3_20_2	23.94

Because of the large variability in percent change in flow due to climate change from the ten models, which averages to be a 16.4% increase, and considering a climate change study report from the University of Washington (2012) that suggests a possible increase of 20-30% in the 100-year floods due to climate change for much of Western Washington, WEST applied a 30% increase to total inflows into the Stillaguamish for the climate change sensitivity analysis. We completed the climate change sensitivity analysis for the 10- and 100-year flood hydrographs.

We ran the WEST 2021 model for the existing and proposed conditions geometry with the increased hydrology. Because of the increased inflows in the sensitivity analysis, HEC-RAS calculates a different flow distribution for the climate change hydrology compared to the study hydrology. As a result, we see a relative maximum increase during the 10-year event of 0.01 ft between existing and proposed conditions, and no increases during the 100-year event. These relative results indicate that there is no discernable impact from the proposed development on the maximum water surface elevations with increased hydrology due to climate change. However, the BFE at the project site increases to 51.25 feet (at XS 0.2403), a relative increase of 2.9 feet from the BFE under the current hydrology.

## 6 SUMMARY AND CONCLUSION

The WEST 2013 and WEST 2017 existing unsteady flow HEC-RAS models of the Stillaguamish River system were modified, validated to pre-existing conditions, and updated to analyze impacts pre- and post-floodplain violation on the Arlington Motor Inn property for the 2-, 10-, 25-, 50-, and 100-year flood events. Model results indicate a BFE of 48.36 ft at the project site. **Table 7** and **Table 8** summarize the flood elevations and flow velocities at a select representative cross section through the property for both the violation and mitigation (post-floodplain violation) conditions.

**Table 7. Flood elevation differences at project site (South Slough XS 0.2403)**

Event	Violation (ft)	Mitigation (ft)	Difference (ft)
2-year	37.496	37.549	0.053
10-year	41.237	41.232	-0.006
25-year	45.725	45.725	0.000
50-year	47.572	47.572	0.000
100-year	48.364	48.364	0.000

**Table 8. Mean total velocity differences at project site (South Slough XS 0.2403)**

<b>Event</b>	<b>Violation (ft/s)</b>	<b>Mitigation (ft/s)</b>	<b>Difference (ft/s)</b>
2-year	0.805	0.847	0.042
10-year	1.199	1.198	-0.001
25-year	1.131	1.131	0.000
50-year	0.963	0.963	0.000
100-year	1.170	1.180	0.010

Comparisons of the maximum water surface elevations between the existing and proposed conditions show that the largest increase in the base flood elevations is 0.00 feet (reported to two decimal places) along South Slough and along the other reaches in the vicinity for all but the 2-yr event. During the 100-year event, velocities increase in the channel near the compensatory storage area slightly by 0.01 ft/s; however, the mean velocity in the right overbank, through the Arlington Motor Inn Property, is essentially unchanged, and also much slower at 0.33 ft/s. The magnitude of increase is not expected to increase erosion potential or change the sediment transport regime in the South Slough reach. No significant change in velocity is observed in the surrounding reaches. Additionally, we evaluated all model locations that border SR 530 and the four cross sections that bound I-5 in the South Slough to assess any potential impacts on SR 530 or I-5. No significant changes to the 100-yr BFE were found immediately upstream of the I-5 crossing between the violation and mitigation conditions. In the cross sections that bound I-5, there is no significant increase to base flood elevations upstream of the crossing. In both cases, the maximum increase is 0.00 ft (to two decimal places). Therefore, the proposed mitigation grading plan will have no discernable impact on the flood levels along SR 530 or to I-5 in the South Slough.

Overall, model results demonstrate that the proposed grading plan will have no discernable impact to water surface elevations in the Stillaguamish River system and its tributaries; particularly the South Slough channel. Channel velocities in the South Slough are slightly increased near the project site, but no impacts are expected as a result. Even considering a significant increase to inflows due to potential climate change impacts and comparing the relative differences between existing and proposed conditions, the proposed project will have negligible hydraulic impacts, although base flood elevations will increase as flows increase.

## 7 REFERENCES

- Federal Emergency Management Agency (2021). Flood insurance Rate Map for the City of Arlington, Washington.
- Fischenich, C. (2001). Stability Threshold for Stream Restoration Materials. EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-29), U.S. Army Engineer Research and Development Center, Vicksburg, MS.
- King County (2009). Surface Water Design Manual. King County Department of Natural Resources and Parks.
- Northwest Hydraulic Consultants (2012). Stillaguamish River Hydraulic Model Development, Draft Report. Prepared for Snohomish County Surface Water management, Prepared by Northwest Hydraulic Consultants, March 2012.
- Snohomish County Surface Water Management Division (2003). Draft Hydraulic Modeling Report – Dwayne Lane Docket Amendment Assessment of Potential Flood Impacts to the Stillaguamish River Valley. Prepared for Snohomish County Department of Planning and Development Services, Prepared by Surface Water Management Division, Snohomish County Department of Public Works, February 2003.
- University of Washington (2012). Estimates of 21<sup>st</sup> Century Flood Risk in the Pacific Northwest based on Regional Scale Climate Model Simulations, May 8, 2012. Work Map for Flood Insurance Study – Stillaguamish River. District File E-2-10-13, U.S. Army Corps of Engineers Seattle District.
- U.S. Army Corps of Engineers (1981). Work Map for Flood Insurance Study – Stillaguamish River. District File E-2-10-13, U.S. Army Corps of Engineers Seattle District.
- Washington Department of Fish and Wildlife (2016). Incorporating Climate Change into the Design of Water Crossing Structures, Final Project Report.
- WEST Consultants, Inc. (2013). Floodplain Impact Analysis of Dwayne Lane’s Arlington Chevrolet New Dealership, Technical Memo, April 1, 2013.
- WEST Consultants, Inc. (2017). Hydraulic Analysis for Pilot Travel Center, Technical August 16, 2017.

**Appendix A: Model Results: Maximum Water Surface Elevations and Maximum Channel Velocities**

### Model Results of Maximum Water Surface Elevations (ft)

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Cook Slough	Upper	3.463	40.935	42.564	42.902	43.149	43.29	40.935	42.564	42.902	43.149	43.29	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	3.462	40.935	42.564	42.902	43.149	43.29	40.935	42.564	42.902	43.148	43.29	0.000	0.000	0.000	0.001	0.000
Cook Slough	Upper	3.385	40.712	42.239	42.541	42.761	42.888	40.712	42.239	42.541	42.761	42.888	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	3.241	39.947	41.483	41.804	42.041	42.183	39.947	41.483	41.804	42.041	42.183	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	3.035	38.536	39.752	39.98	40.147	40.256	38.536	39.752	39.98	40.147	40.256	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	2.89	38.493	39.858	40.132	40.336	40.47	38.493	39.858	40.132	40.336	40.47	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	2.778	37.896	39.252	39.523	39.728	39.859	37.896	39.252	39.523	39.728	39.859	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	2.431	35.951	37.51	37.861	38.159	38.366	35.951	37.509	37.861	38.159	38.366	0.000	0.001	0.000	0.000	0.000
Cook Slough	Upper	2.239	35.549	37.226	37.628	37.977	38.222	35.549	37.226	37.628	37.977	38.222	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	2.01	34.25	36.04	36.516	36.911	37.18	34.25	36.04	36.516	36.911	37.18	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	1.986	33.771	35.595	36.097	36.514	36.796	33.771	35.595	36.097	36.514	36.796	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	1.971	33.747	35.562	36.064	36.48	36.763	33.747	35.562	36.064	36.48	36.763	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	1.959	33.865	35.683	36.18	36.591	36.871	33.865	35.683	36.18	36.591	36.871	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	1.944	33.866	35.698	36.199	36.614	36.896	33.866	35.698	36.199	36.614	36.896	0.000	0.000	0.000	0.000	0.000
Cook Slough	Upper	1.929	34.348	36.168	36.645	37.04	37.309	34.348	36.167	36.645	37.04	37.309	0.000	0.001	0.000	0.000	0.000
Cook Slough	Lower	1.801	34.348	36.168	36.645	37.04	37.309	34.348	36.167	36.645	37.04	37.309	0.000	0.001	0.000	0.000	0.000
Cook Slough	Lower	1.672	33.933	35.859	36.342	36.733	36.996	33.933	35.859	36.342	36.733	36.996	0.000	0.000	0.000	0.000	0.000
Cook Slough	Lower	1.351	33.521	35.537	36.027	36.414	36.673	33.521	35.537	36.026	36.414	36.673	0.000	0.000	0.001	0.000	0.000
Cook Slough	Lower	1.142	33.102	35.292	35.797	36.19	36.449	33.102	35.292	35.797	36.189	36.449	0.000	0.000	0.000	0.001	0.000
Cook Slough	Lower	0.928	32.787	35.103	35.618	36.012	36.27	32.787	35.103	35.618	36.012	36.27	0.000	0.000	0.000	0.000	0.000
Cook Slough	Lower	0.535	31.673	34.325	34.863	35.275	35.542	31.673	34.324	34.863	35.275	35.542	0.000	0.001	0.000	0.000	0.000
Cook Slough	Lower	0.5	30.989	32.63	33.007	33.293	33.482	30.989	32.63	33.007	33.293	33.482	0.000	0.000	0.000	0.000	0.000
Cook Slough	Lower	0.214	30.667	32.239	32.606	32.892	33.082	30.667	32.239	32.606	32.892	33.082	0.000	0.000	0.000	0.000	0.000
Cook Slough	Lower	0.128	30.257	31.722	32.068	32.344	32.529	30.257	31.722	32.067	32.344	32.529	0.000	0.000	0.001	0.000	0.000

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Portage Creek	Upper	6.202	50.702	50.706	50.706	50.8	51.358	50.702	50.706	50.706	50.8	51.358	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	6.033	48.036	47.973	47.973	49.653	51.127	48.036	47.973	47.973	49.653	51.127	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	5.821	46.593	46.568	46.857	49.65	51.126	46.593	46.568	46.857	49.65	51.126	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	5.634	45.994	45.947	46.662	49.575	51.049	45.994	45.947	46.662	49.575	51.049	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	5.49	45.762	45.728	46.463	49.306	50.787	45.762	45.727	46.463	49.306	50.787	0.000	0.001	0.000	0.000	0.000
Portage Creek	Upper	5.406	45.567	45.54	46.147	48.832	50.441	45.567	45.539	46.146	48.832	50.441	0.000	0.001	0.001	0.000	0.000
Portage Creek	Upper	5.368	45.22	45.194	45.787	48.41	49.971	45.22	45.194	45.787	48.41	49.971	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	5.202	43.761	43.733	44.351	47.348	48.733	43.761	43.732	44.351	47.348	48.733	0.000	0.001	0.000	0.000	0.000
Portage Creek	Upper	4.896	42.008	42.002	43.577	47.094	48.381	42.007	42.002	43.577	47.094	48.38	0.001	0.000	0.000	0.000	0.001
Portage Creek	Upper	4.287	39.093	39.572	43.505	47.078	48.352	39.093	39.572	43.504	47.078	48.351	0.000	0.000	0.001	0.000	0.001
Portage Creek	Upper	4.13	38.307	39.372	43.501	47.076	48.344	38.307	39.372	43.501	47.076	48.344	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.932	37.417	39.224	43.501	47.074	48.34	37.417	39.224	43.501	47.074	48.34	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.823	37.278	39.208	43.5	47.071	48.335	37.278	39.208	43.5	47.071	48.335	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.747	37.242	39.201	43.499	47.07	48.33	37.242	39.201	43.499	47.07	48.33	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.657	37.211	39.194	43.498	47.061	48.316	37.211	39.194	43.497	47.061	48.316	0.000	0.000	0.001	0.000	0.000
Portage Creek	Upper	3.64	37.209	39.19	43.493	47.029	48.287	37.209	39.19	43.493	47.029	48.287	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.612	37.196	39.188	43.492	47.015	48.28	37.196	39.187	43.492	47.015	48.28	0.000	0.001	0.000	0.000	0.000
Portage Creek	Upper	3.591	37.189	39.187	43.492	47.007	48.274	37.189	39.187	43.492	47.007	48.274	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.584	37.176	39.187	43.492	47.003	48.272	37.176	39.186	43.492	47.002	48.272	0.000	0.001	0.000	0.001	0.000
Portage Creek	Upper	3.578	37.175	39.185	43.491	46.983	48.27	37.175	39.185	43.491	46.982	48.27	0.000	0.000	0.000	0.001	0.000
Portage Creek	Upper	3.574	36.915	39.183	43.49	46.984	48.27	36.915	39.183	43.49	46.984	48.27	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.57	36.925	39.184	43.246	46.313	48.252	36.925	39.184	43.246	46.313	48.252	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.569	36.924	39.184	43.245	46.302	48.252	36.924	39.184	43.245	46.302	48.252	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.4999	36.836	39.169	42.892	44.782	45.673	36.836	39.169	42.892	44.782	45.673	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.499	36.836	39.169	42.892	44.78	45.393	36.836	39.169	42.892	44.78	45.393	0.000	0.000	0.000	0.000	0.000

Appendix A

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Portage Creek	Upper	3.481	36.82	39.169	42.914	44.92	45.639	36.82	39.169	42.914	44.92	45.639	0.000	0.000	0.000	0.000	0.000
Portage Creek	Upper	3.48	36.82	39.169	42.914	44.92	45.639	36.82	39.169	42.914	44.92	45.639	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	3.197	36.82	39.169	42.914	44.92	45.639	36.82	39.169	42.914	44.92	45.639	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	2.995	35.657	38.232	41.518	43.462	44.241	35.657	38.232	41.518	43.462	44.241	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	2.531	34.474	37.199	39.126	40.503	41.258	34.474	37.199	39.126	40.503	41.258	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	2.289	34.41	36.892	38.282	39.259	39.884	34.41	36.892	38.282	39.259	39.884	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	2.2	34.397	36.849	38.182	39.105	39.719	34.397	36.849	38.182	39.105	39.719	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	2.05	34.382	36.813	38.124	39.012	39.61	34.382	36.813	38.124	39.012	39.61	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	1.887	34.376	36.8	38.084	38.926	39.496	34.376	36.8	38.084	38.926	39.495	0.000	0.000	0.000	0.000	0.001
Portage Creek	Lower	1.533	34.371	36.781	38.022	38.791	39.31	34.371	36.781	38.022	38.791	39.31	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	1.063	34.366	36.574	37.593	38.346	38.884	34.366	36.574	37.592	38.345	38.883	0.000	0.000	0.001	0.001	0.001
Portage Creek	Lower	0.972	34.365	36.52	37.46	38.197	38.74	34.365	36.52	37.46	38.197	38.739	0.000	0.000	0.000	0.000	0.001
Portage Creek	Lower	0.865	34.364	36.473	37.349	38.07	38.612	34.364	36.473	37.349	38.07	38.612	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	0.618	34.362	36.37	37.079	37.742	38.271	34.362	36.37	37.079	37.742	38.271	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	0.468	34.355	36.198	36.709	37.144	37.46	34.355	36.198	36.709	37.144	37.46	0.000	0.000	0.000	0.000	0.000
Portage Creek	Lower	0.449	34.348	36.168	36.645	37.04	37.309	34.348	36.167	36.645	37.04	37.309	0.000	0.001	0.000	0.000	0.000
Portage Creek	Lower	0.448	34.348	36.168	36.645	37.04	37.309	34.348	36.167	36.645	37.04	37.309	0.000	0.001	0.000	0.000	0.000
Silvana	Mainstem	1.644	39.845	42.076	42.397	54.746	54.829	39.845	42.076	42.397	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	1.643	39.387	42.076	42.397	54.746	54.829	39.387	42.076	42.397	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	1.484	38.743	41.392	41.72	54.746	54.829	38.743	41.392	41.72	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	1.224	37.69	39.552	40.001	54.746	54.829	37.69	39.552	40.001	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	1.074	37.511	39.18	39.67	54.746	54.829	37.511	39.18	39.67	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	0.971	37.473	39.066	39.532	54.746	54.829	37.473	39.066	39.532	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	0.817	36.732	38.108	38.578	54.746	54.829	36.732	38.108	38.578	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	0.663	35.93	37.31	37.826	54.746	54.829	35.93	37.31	37.826	54.746	54.829	0.000	0.000	0.000	0.000	0.000

Appendix A

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Silvana	Mainstem	0.505	35.637	37.112	37.624	54.746	54.829	35.637	37.112	37.624	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	0.343	35.259	36.57	36.999	54.746	54.829	35.259	36.57	36.999	54.746	54.829	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	0.176	34.437	36.197	36.655	38.766	39.077	34.437	36.197	36.655	38.766	39.077	0.000	0.000	0.000	0.000	0.000
Silvana	Mainstem	0.151	34.348	36.168	36.645	37.04	37.309	34.348	36.167	36.645	37.04	37.309	0.000	0.001	0.000	0.000	0.000
South Slough	Mainstem	1.475	43.382	43.378	45.787	47.588	48.356	43.382	43.378	45.787	47.588	48.356	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	1.474	43.335	43.331	45.782	47.586	48.355	43.335	43.331	45.782	47.586	48.354	0.000	0.000	0.000	0.000	0.001
South Slough	Mainstem	1.302	43.263	43.259	45.774	47.584	48.353	43.263	43.259	45.774	47.584	48.353	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	1.178	41.411	41.993	45.764	47.582	48.352	41.411	41.993	45.764	47.582	48.352	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	1.04	39.648	41.368	45.757	47.581	48.351	39.648	41.368	45.757	47.581	48.351	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.963	39.563	41.352	45.756	47.58	48.35	39.563	41.352	45.756	47.58	48.35	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.855	39.442	41.331	45.754	47.58	48.35	39.442	41.331	45.754	47.58	48.35	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.724	39.314	41.313	45.753	47.579	48.35	39.314	41.313	45.753	47.579	48.349	0.000	0.000	0.000	0.000	0.001
South Slough	Mainstem	0.65	39.278	41.308	45.752	47.579	48.349	39.278	41.308	45.752	47.579	48.349	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.48	39.242	41.305	45.752	47.579	48.351	39.242	41.305	45.752	47.579	48.351	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.458	39.236	41.299	45.749	47.583	48.361	39.236	41.299	45.749	47.583	48.361	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.44	39.214	41.299	45.749	47.583	48.362	39.214	41.298	45.749	47.583	48.362	0.000	0.001	0.000	0.000	0.000
South Slough	Mainstem	0.422	39.209	41.298	45.749	47.583	48.363	39.209	41.298	45.749	47.583	48.363	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.412	39.163	41.297	45.749	47.583	48.364	39.163	41.297	45.749	47.583	48.364	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.385	39.115	41.293	45.747	47.584	48.367	39.115	41.293	45.747	47.584	48.367	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.348	39.034	41.289	45.746	47.584	48.37	39.034	41.289	45.746	47.584	48.37	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.33	38.86	41.287	45.746	47.584	48.372	38.86	41.287	45.746	47.584	48.372	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.313	38.783	41.283	45.745	47.583	48.373	38.783	41.283	45.745	47.583	48.373	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.308	38.611	41.283	45.745	47.583	48.373	38.611	41.283	45.745	47.583	48.373	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.277	38.6	41.276	45.742	47.581	48.373	38.6	41.276	45.742	47.581	48.373	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.244	37.551	41.245	45.741	47.581	48.372	37.551	41.245	45.741	47.581	48.372	0.000	0.000	0.000	0.000	0.000

Appendix A

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
South Slough	Mainstem	0.2405	37.549	41.233	45.735	47.581	48.372	37.549	41.233	45.735	47.58	48.372	0.000	0.000	0.000	0.001	0.000
South Slough	Mainstem	0.2404	37.549	41.232	45.725	47.572	48.365	37.549	41.232	45.725	47.572	48.365	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.2403	37.549	41.232	45.725	47.572	48.364	37.549	41.231	45.725	47.572	48.364	0.000	0.001	0.000	0.000	0.000
South Slough	Mainstem	0.2402	37.549	41.231	45.725	47.572	48.363	37.549	41.231	45.725	47.572	48.363	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.24	37.549	41.231	45.725	47.572	48.362	37.549	41.231	45.725	47.572	48.362	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.087	36.82	39.169	42.912	44.918	45.635	36.82	39.169	42.912	44.918	45.635	0.000	0.000	0.000	0.000	0.000
South Slough	Mainstem	0.086	36.82	39.169	42.914	44.92	45.639	36.82	39.169	42.914	44.92	45.639	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	18.003	67.184	69.724	70.393	70.91	71.216	67.183	69.724	70.393	70.91	71.216	0.001	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	18.002	67.183	69.724	70.393	70.91	71.216	67.183	69.724	70.393	70.91	71.216	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	17.857	66.513	69.023	69.666	70.142	70.417	66.513	69.023	69.666	70.142	70.417	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	17.59	65.886	68.487	69.172	69.679	69.978	65.886	68.487	69.172	69.679	69.978	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	17.327	64.793	66.99	67.581	68.005	68.26	64.793	66.99	67.581	68.005	68.26	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	17.029	63.312	65.98	66.7	67.217	67.523	63.312	65.98	66.7	67.217	67.523	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	16.691	61.585	64.529	65.33	65.948	66.324	61.585	64.529	65.33	65.948	66.324	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	16.119	60.127	63.127	63.942	64.627	65.067	60.127	63.127	63.942	64.627	65.067	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	15.722	59.365	62.431	63.259	63.976	64.449	59.365	62.431	63.259	63.976	64.449	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	15.56	58.804	61.746	62.549	63.274	63.765	58.804	61.746	62.549	63.274	63.765	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	15.209	57.279	59.971	60.681	61.268	61.657	57.279	59.971	60.681	61.268	61.657	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	14.786	55.616	58.509	59.192	59.776	60.16	55.616	58.509	59.192	59.776	60.16	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	14.539	54.599	57.618	58.338	58.967	59.378	54.599	57.618	58.338	58.967	59.378	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	14.5	54.182	57.293	58.059	58.715	59.139	54.182	57.293	58.059	58.714	59.139	0.000	0.000	0.000	0.001	0.000
Stillaguamish	Arly to I5	14.252	53.166	56.225	57.032	57.7	58.117	53.166	56.225	57.032	57.7	58.117	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	13.962	51.85	54.586	55.341	55.962	56.34	51.85	54.586	55.341	55.962	56.34	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	13.561	50.13	52.546	53.138	53.603	53.874	50.13	52.546	53.138	53.603	53.874	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	13.13	48.699	51.062	51.622	52.059	52.31	48.699	51.062	51.622	52.059	52.31	0.000	0.000	0.000	0.000	0.000

Appendix A

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Stillaguamish	Arly to I5	12.848	47.717	50.077	50.636	51.075	51.329	47.717	50.076	50.636	51.075	51.329	0.000	0.001	0.000	0.000	0.000
Stillaguamish	Arly to I5	12.607	46.767	49.081	49.645	50.096	50.359	46.767	49.081	49.645	50.096	50.359	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	12.228	45.965	48.353	48.937	49.397	49.663	45.965	48.353	48.937	49.397	49.663	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	11.863	44.621	47.657	48.405	48.972	49.292	44.621	47.657	48.405	48.972	49.292	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	11.508	42.967	45.388	45.979	46.428	46.678	42.967	45.388	45.979	46.428	46.678	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	11.419	41.989	43.841	44.234	44.518	44.677	41.989	43.841	44.234	44.518	44.677	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	11.238	41.105	42.772	43.11	43.354	43.492	41.105	42.772	43.11	43.354	43.492	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Arly to I5	11.175	40.935	42.564	42.902	43.149	43.29	40.935	42.564	42.902	43.149	43.29	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	11.092	40.935	42.564	42.902	43.149	43.29	40.935	42.564	42.902	43.149	43.29	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	11.091	40.935	42.564	42.902	43.148	43.29	40.935	42.564	42.902	43.148	43.29	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	10.987	40.481	41.974	42.303	42.546	42.688	40.481	41.974	42.303	42.546	42.688	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	10.809	39.957	41.261	41.569	41.803	41.941	39.957	41.261	41.569	41.803	41.941	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	10.458	39.394	40.724	41.036	41.273	41.414	39.394	40.724	41.036	41.273	41.413	0.000	0.000	0.000	0.000	0.001
Stillaguamish	Upper	10.284	39.033	40.428	40.761	41.014	41.165	39.033	40.428	40.761	41.014	41.165	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	10.114	38.627	40.052	40.404	40.674	40.835	38.627	40.052	40.404	40.674	40.835	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	9.76	37.819	39.508	39.967	40.317	40.525	37.819	39.508	39.967	40.317	40.524	0.000	0.000	0.000	0.000	0.001
Stillaguamish	Upper	9.414	37.213	38.78	39.304	39.724	39.984	37.213	38.78	39.304	39.724	39.984	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	9.248	36.885	38.321	38.843	39.418	39.57	36.885	38.321	38.843	39.418	39.57	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	8.991	35.761	37.843	38.394	38.855	39.128	35.761	37.843	38.394	38.855	39.128	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	8.727	34.947	36.609	37.079	37.482	37.751	34.947	36.609	37.079	37.482	37.751	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	8.341	34.313	35.543	35.919	36.27	36.513	34.313	35.543	35.919	36.27	36.513	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	8.095	33.801	34.927	35.26	35.568	35.779	33.801	34.927	35.26	35.568	35.779	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	7.918	33.436	34.554	34.871	35.16	35.356	33.436	34.554	34.871	35.16	35.356	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	7.759	33.009	34.033	34.306	34.546	34.704	33.009	34.033	34.306	34.546	34.704	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	7.717	32.893	33.904	34.17	34.398	34.547	32.893	33.904	34.17	34.398	34.547	0.000	0.000	0.000	0.000	0.000

Appendix A

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Stillaguamish	Upper	7.536	32.75	33.795	34.07	34.307	34.461	32.75	33.795	34.07	34.307	34.461	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	7.241	32.221	33.324	33.618	33.866	34.026	32.221	33.324	33.618	33.866	34.026	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	7.08	31.836	32.998	33.306	33.568	33.741	31.836	32.998	33.306	33.568	33.741	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.903	31.505	32.801	33.138	33.427	33.618	31.505	32.801	33.138	33.427	33.618	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.734	31.252	32.652	33.011	33.32	33.526	31.252	32.652	33.011	33.32	33.526	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.472	30.69	32.113	32.463	32.755	32.952	30.69	32.113	32.463	32.755	32.952	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.394	30.218	31.652	31.984	32.249	32.426	30.218	31.652	31.984	32.249	32.426	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.344	30.286	31.75	32.095	32.374	32.561	30.286	31.75	32.095	32.374	32.561	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.297	30.257	31.722	32.068	32.344	32.529	30.257	31.722	32.068	32.344	32.529	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Upper	6.296	30.257	31.722	32.068	32.344	32.529	30.257	31.722	32.067	32.344	32.529	0.000	0.000	0.001	0.000	0.000
Stillaguamish	Norman Rd	6.102	30.257	31.722	32.068	32.344	32.529	30.257	31.722	32.067	32.344	32.529	0.000	0.000	0.001	0.000	0.000
Stillaguamish	Norman Rd	6.101	30.186	31.506	31.799	32.031	32.184	30.186	31.506	31.799	32.031	32.184	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	5.735	29.51	30.68	30.928	31.122	31.249	29.51	30.68	30.928	31.122	31.249	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	5.457	28.676	29.681	29.887	30.046	30.15	28.676	29.681	29.887	30.046	30.15	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	5.117	27.578	28.391	28.552	28.675	28.755	27.578	28.39	28.552	28.674	28.755	0.000	0.001	0.000	0.001	0.000
Stillaguamish	Norman Rd	4.932	27.357	28.144	28.299	28.417	28.494	27.357	28.144	28.299	28.417	28.494	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	4.782	26.914	27.633	27.77	27.874	27.941	26.914	27.633	27.77	27.874	27.941	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	4.417	25.861	26.537	26.665	26.762	26.824	25.861	26.537	26.665	26.762	26.824	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	4.219	25.466	26.12	26.242	26.335	26.395	25.466	26.12	26.242	26.335	26.395	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	3.968	24.589	25.123	25.218	25.289	25.334	24.589	25.123	25.218	25.289	25.334	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	3.69	23.747	24.23	24.315	24.377	24.418	23.747	24.23	24.315	24.377	24.417	0.000	0.000	0.000	0.000	0.001
Stillaguamish	Norman Rd	3.242	21.902	22.327	22.4	22.453	22.488	21.902	22.327	22.399	22.453	22.488	0.000	0.000	0.001	0.000	0.000
Stillaguamish	Norman Rd	2.931	20.485	20.877	20.943	20.991	21.022	20.485	20.877	20.943	20.991	21.022	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	2.868	20.332	20.712	20.776	20.823	20.852	20.332	20.712	20.776	20.823	20.852	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	2.524	19.129	19.473	19.53	19.571	19.598	19.129	19.473	19.53	19.571	19.598	0.000	0.000	0.000	0.000	0.000

Appendix A

River	Reach	River Sta	Existing (Violation) Max WSE (ft)					Proposed (mitigation) Conditions Max WSE (ft)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Stillaguamish	Norman Rd	2.09	17.503	17.871	17.932	17.977	18.005	17.503	17.871	17.932	17.977	18.005	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	2.06	17.152	17.518	17.579	17.624	17.653	17.152	17.518	17.579	17.624	17.653	0.000	0.000	0.000	0.000	0.000
Stillaguamish	Norman Rd	1.967	16.797	17.186	17.251	17.299	17.329	16.797	17.186	17.251	17.298	17.329	0.000	0.000	0.000	0.001	0.000
Thomsen Slough	Mainstem	1.632	40.543	40.571	40.758	40.853	41.014	40.543	40.571	40.758	40.853	41.014	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	1.631	40.508	40.508	40.704	40.813	40.976	40.508	40.508	40.704	40.813	40.976	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	1.49	39.216	39.98	40.35	40.59	40.786	39.216	39.98	40.35	40.59	40.786	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	1.34	36.941	39.602	40.06	40.379	40.617	36.941	39.602	40.06	40.379	40.617	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	1.273	36.69	39.12	39.512	39.793	40.064	36.69	39.12	39.512	39.793	40.064	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	1.149	35.962	38.265	38.582	38.861	39.222	35.962	38.265	38.582	38.861	39.222	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	1.02	35.884	38.074	38.414	38.765	39.188	35.884	38.074	38.414	38.765	39.188	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.821	35.882	37.996	38.339	38.726	39.178	35.882	37.996	38.339	38.726	39.178	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.654	35.837	37.719	38.072	38.587	39.066	35.837	37.719	38.072	38.587	39.066	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.527	35.79	37.444	37.761	38.27	38.692	35.79	37.444	37.761	38.27	38.692	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.325	35.271	36.831	37.246	37.731	38.118	35.271	36.831	37.246	37.731	38.118	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.151	34.678	36.333	36.906	37.438	37.848	34.678	36.333	36.906	37.438	37.848	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.017	34.226	35.954	36.545	37.034	37.426	34.226	35.954	36.545	37.034	37.426	0.000	0.000	0.000	0.000	0.000
Thomsen Slough	Mainstem	0.016	34.206	35.93	36.519	37.011	37.404	34.206	35.93	36.519	37.011	37.404	0.000	0.000	0.000	0.000	0.000

### Model Results of Maximum Velocities (ft/s)

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Cook Slough	Upper	3.463	4.77	5.95	6.32	6.58	6.74	4.77	5.95	6.32	6.58	6.74	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	3.462	4.77	5.95	6.32	6.58	6.74	4.77	5.95	6.32	6.58	6.74	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	3.385	4.95	6.24	6.65	6.95	7.11	4.95	6.24	6.65	6.95	7.11	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	3.241	6.32	7.27	7.54	7.74	7.84	6.32	7.27	7.54	7.74	7.84	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	3.035	7.54	8.74	9.07	9.31	9.44	7.54	8.74	9.07	9.31	9.44	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	2.89	4.65	5.12	5.25	5.34	5.37	4.65	5.12	5.25	5.34	5.37	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	2.778	6.36	6.82	6.94	7.02	7.06	6.36	6.82	6.94	7.02	7.06	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	2.431	8.14	8.28	8.25	8.17	8.08	8.14	8.28	8.25	8.17	8.08	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	2.239	6.24	6.21	6.11	5.97	5.84	6.24	6.21	6.11	5.97	5.84	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	2.01	7.82	7.79	7.64	7.5	7.41	7.82	7.79	7.64	7.5	7.41	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	1.986	9.19	9.17	8.98	8.82	8.71	9.19	9.17	8.98	8.82	8.71	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	1.971	8.82	8.81	8.64	8.49	8.39	8.82	8.81	8.64	8.49	8.39	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	1.959	8.09	8.07	7.92	7.78	7.69	8.09	8.07	7.92	7.78	7.69	0.00	0.00	0.00	0.00	0.00
Cook Slough	Upper	1.944	7.74	7.69	7.54	7.4	7.3	7.74	7.7	7.54	7.4	7.3	0.00	-0.01	0.00	0.00	0.00
Cook Slough	Upper	1.929	4.85	4.87	4.79	4.72	4.67	4.85	4.87	4.79	4.72	4.67	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	1.801	5.87	5.94	5.94	6.02	6.09	5.87	5.94	5.94	6.02	6.09	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	1.672	6	5.72	5.75	5.84	5.94	6	5.72	5.75	5.84	5.94	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	1.351	4.01	3.72	3.74	3.8	3.85	4.01	3.72	3.74	3.8	3.85	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	1.142	5.15	4.4	4.35	4.37	4.41	5.15	4.4	4.35	4.37	4.41	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	0.928	4.73	4	3.96	4	4.05	4.73	4	3.96	4	4.05	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	0.535	6.47	5.95	5.96	5.96	5.97	6.47	5.95	5.96	5.96	5.97	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	0.5	7.11	8.19	8.44	8.6	8.71	7.11	8.19	8.44	8.6	8.71	0.00	0.00	0.00	0.00	0.00
Cook Slough	Lower	0.214	3.16	3.57	3.66	3.71	3.74	3.16	3.57	3.66	3.71	3.74	0.00	0.00	0.00	0.00	0.00

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Cook Slough	Lower	0.128	5.85	6.79	6.99	7.1	7.16	5.85	6.79	6.99	7.1	7.16	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	6.202	1.64	2.37	2.37	1.98	0.76	1.64	2.37	2.37	1.98	0.76	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	6.033	1.03	0.89	0.89	0.09	0.05	1.03	0.89	0.89	0.09	0.05	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	5.821	0.67	0.63	0.38	0.05	0.03	0.67	0.63	0.38	0.05	0.03	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	5.634	0.8	0.59	0.54	0.94	1.12	0.8	0.59	0.54	0.94	1.12	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	5.49	0.8	0.79	1.05	2.01	2.29	0.8	0.79	1.05	2.01	2.29	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	5.406	1.2	1.18	1.49	2.74	2.65	1.2	1.18	1.49	2.74	2.65	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	5.368	1.87	1.86	2.07	3.31	4.52	1.87	1.86	2.07	3.31	4.52	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	5.202	1.23	1.22	1.5	1.5	2.09	1.23	1.22	1.5	1.5	2.09	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	4.896	1.12	0.74	0.42	0.44	0.65	1.12	0.74	0.42	0.44	0.65	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	4.287	0.96	0.68	0.26	0.24	0.45	0.96	0.68	0.26	0.24	0.45	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	4.13	1.43	0.83	0.07	0.15	0.27	1.43	0.83	0.07	0.15	0.27	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.932	0.95	0.5	0.08	0.18	0.32	0.95	0.5	0.08	0.18	0.32	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.823	0.32	0.19	0.11	0.37	0.52	0.32	0.19	0.11	0.37	0.52	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.747	0.44	0.37	0.18	0.34	0.6	0.44	0.37	0.18	0.34	0.6	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.657	0.29	0.25	0.18	0.67	0.91	0.29	0.25	0.18	0.67	0.91	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.64	0.23	0.2	0.16	0.64	0.79	0.23	0.2	0.16	0.64	0.79	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.612	0.36	0.32	0.24	1.07	1.05	0.36	0.32	0.24	1.07	1.05	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.591	0.27	0.27	0.2	1.00	0.99	0.27	0.27	0.2	1.00	0.99	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.584	0.26	0.25	0.2	1.05	0.99	0.26	0.25	0.2	1.05	0.99	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.578	0.35	0.35	0.28	1.53	1.12	0.35	0.35	0.28	1.53	1.12	0.00	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.574	1.54	0.45	0.34	1.7	0.86	1.52	0.45	0.34	1.7	0.86	0.02	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.57	1.03	0.32	2.65	5.11	1.62	1.00	0.32	2.65	5.11	1.62	0.03	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.569	1.03	0.32	2.65	5.15	1.63	1.00	0.32	2.65	5.15	1.63	0.03	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.4999	0.98	0.3	2.54	5.54	6.92	0.95	0.3	2.54	5.54	6.92	0.03	0.00	0.00	0.00	0.00

Appendix A

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Portage Creek	Upper	3.499	0.98	0.3	2.54	5.54	7.12	0.95	0.3	2.54	5.54	7.12	0.03	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.481	0.46	0.13	0.99	2.1	2.68	0.45	0.13	0.99	2.1	2.68	0.01	0.00	0.00	0.00	0.00
Portage Creek	Upper	3.48	0.46	0.13	0.98	2.1	2.67	0.45	0.13	0.98	2.1	2.67	0.01	0.00	0.00	0.00	0.00
Portage Creek	Lower	3.197	1.45	1.49	2.35	2.89	3.02	1.47	1.49	2.35	2.89	3.02	-0.02	0.00	0.00	0.00	0.00
Portage Creek	Lower	2.995	1.01	1.08	1.86	2.34	2.48	1.01	1.08	1.86	2.34	2.48	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	2.531	0.41	1	2.02	2.92	3.37	0.41	1.00	2.02	2.92	3.37	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	2.289	0.29	0.93	1.88	2.39	2.53	0.29	0.93	1.88	2.39	2.53	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	2.2	0.41	0.85	1.09	1.42	1.57	0.41	0.85	1.09	1.42	1.57	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	2.05	0.21	0.24	0.44	0.68	0.82	0.21	0.24	0.44	0.68	0.82	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	1.887	0.18	0.42	0.82	1.28	1.53	0.18	0.42	0.82	1.28	1.53	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	1.533	0.1	0.21	0.44	0.7	0.87	0.1	0.21	0.44	0.7	0.87	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	1.063	0.17	1.54	2.33	2.41	2.36	0.17	1.54	2.33	2.41	2.36	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	0.972	0.12	1.03	1.7	1.9	1.94	0.12	1.03	1.7	1.9	1.94	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	0.865	0.12	0.9	1.46	1.65	1.69	0.12	0.9	1.46	1.65	1.69	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	0.618	0.11	0.95	1.71	2.02	2.15	0.11	0.95	1.71	2.02	2.15	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	0.468	0.34	1.8	2.62	3.37	3.97	0.34	1.8	2.62	3.37	3.97	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	0.449	0.4	2.29	3.49	4.66	5.64	0.4	2.29	3.49	4.66	5.64	0.00	0.00	0.00	0.00	0.00
Portage Creek	Lower	0.448	0.4	2.29	3.49	4.66	5.64	0.4	2.29	3.49	4.66	5.64	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	1.644	0.01	0.03	0.03	0.01	0.01	0.01	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	1.643	0.06	0.03	0.03	0.01	0.01	0.06	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	1.484	0.83	2.06	2.14	0.01	0.01	0.83	2.06	2.14	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	1.224	1.04	2.05	2.02	0	0	1.04	2.05	2.02	0	0	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	1.074	0.35	0.61	0.7	0	0	0.35	0.61	0.7	0	0	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	0.971	0.52	0.91	1.02	0	0	0.52	0.91	1.02	0	0	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	0.817	1.54	1.94	1.99	0	0	1.54	1.94	1.99	0	0	0.00	0.00	0.00	0.00	0.00

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Silvana	Mainstem	0.663	0.75	0.7	0.72	0	0	0.75	0.7	0.72	0	0	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	0.505	0.83	1.02	1.14	0.01	0.01	0.83	1.02	1.14	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	0.343	1.17	1.78	2.02	0.01	0.01	1.17	1.78	2.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	0.176	0.83	0.55	0.32	0.25	0.39	0.83	0.55	0.32	0.25	0.39	0.00	0.00	0.00	0.00	0.00
Silvana	Mainstem	0.151	0.68	1.14	0.72	0.43	-0.03	0.69	1.14	0.72	0.43	-0.04	-0.01	0.00	0.00	0.00	0.01
South Slough	Mainstem	1.475	0.85	0.85	0.42	0.28	0.26	0.85	0.85	0.42	0.28	0.26	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	1.474	0.86	0.86	0.43	0.28	0.26	0.86	0.86	0.43	0.28	0.26	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	1.302	0.42	0.42	0.22	0.14	0.13	0.42	0.42	0.22	0.14	0.13	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	1.178	2.53	1.69	0.29	0.17	0.15	2.53	1.7	0.29	0.17	0.15	0.00	-0.01	0.00	0.00	0.00
South Slough	Mainstem	1.04	0.65	0.37	0.14	0.09	0.08	0.65	0.37	0.14	0.09	0.08	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.963	0.79	0.4	0.15	0.11	0.1	0.79	0.4	0.15	0.11	0.1	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.855	0.73	0.39	0.16	0.12	0.11	0.73	0.39	0.16	0.12	0.11	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.724	0.55	0.34	0.12	0.05	-0.12	0.55	0.34	0.12	0.05	-0.12	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.65	0.28	0.22	0.1	0.01	-0.28	0.28	0.22	0.1	0.01	-0.28	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.48	0.11	0.09	0.04	-0.11	-0.35	0.11	0.09	0.04	-0.11	-0.35	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.458	0.14	0.11	0.05	-0.13	-0.43	0.14	0.11	0.05	-0.13	-0.43	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.44	0.2	0.13	0.05	-0.12	-0.45	0.2	0.13	0.05	-0.12	-0.45	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.422	0.32	0.18	0.07	-0.13	-0.47	0.32	0.18	0.07	-0.13	-0.47	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.412	0.57	0.19	0.08	-0.11	-0.44	0.57	0.19	0.08	-0.11	-0.44	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.385	0.54	0.33	0.27	0	-0.48	0.54	0.33	0.27	0	-0.48	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.348	0.37	0.25	0.22	0	-0.41	0.37	0.25	0.22	0	-0.41	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.33	0.87	0.25	0.22	0.04	-0.31	0.87	0.25	0.22	0.04	-0.31	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.313	0.78	0.36	0.2	0.08	-0.22	0.78	0.36	0.2	0.08	-0.22	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.308	0.5	0.28	0.25	0.19	-0.04	0.5	0.28	0.25	0.19	-0.04	0.00	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.277	0.37	0.35	0.41	0.39	0.16	0.37	0.35	0.41	0.39	0.16	0.00	0.00	0.00	0.00	0.00

Appendix A

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
South Slough	Mainstem	0.244	0.86	0.84	0.2	0.12	0.15	0.91	0.84	0.2	0.12	0.15	-0.05	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.2405	0.8	1.18	0.99	0.65	0.19	0.85	1.18	0.99	0.65	0.19	-0.05	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.2404	0.8	1.2	1.13	0.96	1.18	0.85	1.2	1.13	0.96	1.18	-0.05	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.2403	0.8	1.2	1.13	0.96	1.17	0.85	1.2	1.13	0.96	1.18	-0.05	0.00	0.00	0.00	-0.01
South Slough	Mainstem	0.2402	0.81	1.2	1.13	0.96	1.17	0.85	1.2	1.13	0.96	1.17	-0.04	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.24	0.81	1.2	1.13	0.96	1.19	0.84	1.2	1.13	0.96	1.19	-0.03	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.087	0.61	1.14	1	0.81	1.23	0.63	1.14	1	0.81	1.23	-0.02	0.00	0.00	0.00	0.00
South Slough	Mainstem	0.086	0.61	1.14	0.95	0.75	1.13	0.63	1.14	0.95	0.75	1.13	-0.02	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	18.003	6.83	8.4	9	9.67	10.18	6.83	8.4	9	9.67	10.18	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	18.002	6.83	8.4	9	9.67	10.18	6.83	8.4	9	9.67	10.18	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	17.857	6.55	7.81	8.3	8.87	9.3	6.55	7.81	8.3	8.87	9.3	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	17.59	4	4.66	4.86	5.09	5.26	4	4.66	4.86	5.09	5.26	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	17.327	6.54	8.23	8.65	9.03	9.26	6.54	8.23	8.65	9.03	9.26	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	17.029	8.22	7.98	7.79	7.63	7.54	8.22	7.98	7.79	7.63	7.54	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	16.691	8.03	8.06	8.16	7.93	7.79	8.03	8.06	8.16	7.93	7.79	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	16.119	2.9	3.62	3.75	3.79	3.8	2.9	3.62	3.75	3.79	3.8	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	15.722	4.51	4.37	4.37	4.32	4.25	4.51	4.37	4.37	4.32	4.25	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	15.56	5.44	6.59	6.87	6.96	6.97	5.44	6.59	6.87	6.96	6.97	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	15.209	7.61	9.04	9.47	9.9	10.19	7.61	9.04	9.47	9.9	10.19	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	14.786	5.53	5.79	5.91	6.01	6.08	5.53	5.79	5.91	6.01	6.08	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	14.539	5.42	5.32	5.34	5.31	5.28	5.42	5.32	5.34	5.31	5.28	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	14.5	7.35	7.26	7.08	6.97	6.91	7.35	7.26	7.08	6.97	6.91	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	14.252	5.43	5.7	5.73	5.83	5.95	5.43	5.7	5.73	5.83	5.95	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	13.962	6.89	8.21	8.64	9	9.26	6.89	8.21	8.64	9	9.26	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	13.561	7.6	9.16	9.75	10.27	10.62	7.6	9.16	9.75	10.27	10.62	0.00	0.00	0.00	0.00	0.00

Appendix A

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Stillaguamish	Arly to I5	13.13	5.43	5.99	6.16	6.3	6.39	5.43	5.99	6.16	6.3	6.39	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	12.848	6.74	7.43	7.59	7.7	7.77	6.74	7.43	7.59	7.7	7.77	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	12.607	6.28	6.94	7.05	7.12	7.15	6.28	6.94	7.05	7.12	7.15	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	12.228	4.19	4.51	4.58	4.64	4.68	4.19	4.51	4.58	4.64	4.68	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	11.863	6.47	5.11	4.7	4.41	4.25	6.47	5.11	4.7	4.41	4.25	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	11.508	7.13	8.87	9.33	9.67	9.87	7.13	8.87	9.33	9.67	9.87	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	11.419	8.23	10.48	11.11	11.6	11.87	8.23	10.48	11.11	11.6	11.87	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	11.238	7.6	9.44	9.96	10.35	10.57	7.6	9.44	9.96	10.35	10.57	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Arly to I5	11.175	6.78	8.42	8.85	9.16	9.34	6.78	8.42	8.85	9.16	9.34	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	11.092	5.77	7.29	7.55	7.77	7.89	5.77	7.29	7.55	7.77	7.89	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	11.091	5.77	7.29	7.56	7.77	7.89	5.77	7.29	7.56	7.77	7.89	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	10.987	5.82	7.2	7.41	7.56	7.64	5.82	7.2	7.41	7.56	7.64	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	10.809	5	6.29	6.47	6.6	6.65	5	6.29	6.47	6.6	6.65	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	10.458	3.74	3.61	3.61	3.62	3.63	3.74	3.61	3.61	3.62	3.63	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	10.284	3.42	3.32	3.25	3.2	3.16	3.42	3.32	3.25	3.2	3.16	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	10.114	3.76	3.94	3.91	3.88	3.84	3.76	3.94	3.91	3.88	3.84	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	9.76	4.67	4.22	3.9	3.63	3.46	4.67	4.22	3.9	3.63	3.46	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	9.414	3.66	4.53	4.43	4.26	4.1	3.66	4.53	4.43	4.26	4.1	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	9.248	4.37	5.47	5.52	3.55	2.65	4.37	5.47	5.52	3.55	2.65	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	8.991	6.6	4.74	4.69	3.5	4.52	6.6	4.74	4.69	3.5	4.52	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	8.727	4.43	6.18	6.5	6.7	6.8	4.43	6.18	6.5	6.7	6.8	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	8.341	3.01	4.14	4.41	4.58	4.68	3.01	4.14	4.41	4.58	4.68	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	8.095	4.78	5.53	5.8	6.08	6.27	4.78	5.53	5.8	6.08	6.27	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	7.918	4.17	4.43	4.59	4.77	4.9	4.17	4.43	4.59	4.77	4.9	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	7.759	4.38	5.01	5.28	5.56	5.77	4.38	5.01	5.28	5.56	5.77	0.00	0.00	0.00	0.00	0.00

Appendix A

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Stillaguamish	Upper	7.717	4.38	4.98	5.24	5.52	5.72	4.38	4.98	5.24	5.52	5.72	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	7.536	3.46	3.64	3.74	3.85	3.94	3.46	3.64	3.74	3.85	3.94	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	7.241	3.53	3.5	3.48	3.48	3.48	3.53	3.5	3.48	3.48	3.48	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	7.08	4.03	3.93	3.9	3.87	3.83	4.03	3.93	3.9	3.87	3.83	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.903	3.9	3.37	3.21	3.06	2.95	3.9	3.37	3.21	3.06	2.95	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.734	3.13	2.59	2.4	2.25	2.11	3.13	2.59	2.4	2.25	2.11	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.472	3.69	4	4.14	4.29	4.39	3.69	4	4.14	4.29	4.39	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.394	5.33	5.72	5.92	6.16	6.32	5.33	5.72	5.92	6.16	6.32	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.344	2.42	2.5	2.56	2.65	2.71	2.42	2.5	2.56	2.65	2.71	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.297	2.21	2.28	2.34	2.42	2.48	2.21	2.28	2.34	2.42	2.48	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Upper	6.296	2.21	2.28	2.34	2.42	2.48	2.21	2.28	2.34	2.42	2.48	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	6.102	5.64	6.13	6.25	6.34	6.4	5.64	6.13	6.25	6.34	6.4	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	6.101	5.88	6.89	7.18	7.43	7.59	5.88	6.89	7.18	7.43	7.59	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	5.735	4.84	5.64	5.86	6.03	6.15	4.84	5.64	5.86	6.03	6.15	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	5.457	6.45	7.42	7.66	7.85	7.98	6.45	7.42	7.66	7.85	7.98	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	5.117	6.57	7.44	7.65	7.81	7.92	6.57	7.44	7.65	7.81	7.92	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	4.932	4.46	5	5.12	5.23	5.3	4.46	5	5.12	5.23	5.3	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	4.782	5.49	6.11	6.26	6.37	6.45	5.49	6.11	6.26	6.37	6.45	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	4.417	6.58	6.97	7.05	7.12	7.16	6.58	6.97	7.05	7.12	7.16	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	4.219	5.55	5.82	5.88	5.93	5.96	5.55	5.82	5.88	5.93	5.96	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	3.968	6.45	6.97	7.08	7.17	7.22	6.45	6.97	7.08	7.17	7.22	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	3.69	6.29	6.69	6.77	6.84	6.88	6.29	6.69	6.77	6.84	6.88	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	3.242	7.33	7.6	7.66	7.69	7.72	7.33	7.6	7.66	7.69	7.72	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	2.931	6.76	6.96	7	7.03	7.05	6.76	6.96	7	7.03	7.05	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	2.868	5.66	5.89	5.93	5.96	6	5.66	5.89	5.93	5.96	6	0.00	0.00	0.00	0.00	0.00

Appendix A

River	Reach	River Sta	Existing (Violation) Conditions Max Vel (ft/s)					Proposed (Mitigation) Conditions Max Vel (ft/s)					Difference (Proposed-Existing)				
			Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100	Q2	Q10	Q25	Q50	Q100
Stillaguamish	Norman Rd	2.524	6.72	6.95	6.99	7.02	7.04	6.72	6.95	6.99	7.02	7.04	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	2.09	6.17	6.26	6.27	6.28	6.29	6.17	6.26	6.27	6.28	6.29	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	2.06	6.62	6.71	6.72	6.73	6.74	6.62	6.71	6.72	6.73	6.74	0.00	0.00	0.00	0.00	0.00
Stillaguamish	Norman Rd	1.967	6.49	6.54	6.55	6.55	6.55	6.49	6.54	6.55	6.55	6.55	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.632	0.39	0.56	0.49	0.43	0.41	0.39	0.56	0.49	0.43	0.41	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.631	0.15	0.15	0.51	0.44	0.42	0.15	0.15	0.51	0.44	0.42	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.49	0.22	0.65	0.49	0.3	0.26	0.22	0.65	0.49	0.3	0.26	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.34	0	0.41	0.5	0.55	0.55	0	0.41	0.5	0.55	0.55	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.273	0.8	1.53	1.79	1.92	1.97	0.8	1.53	1.79	1.92	1.97	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.149	0.32	0.72	0.69	0.57	0.36	0.32	0.72	0.69	0.57	0.36	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	1.02	0.09	0.5	0.48	0.38	0.22	0.09	0.5	0.48	0.38	0.22	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.821	0.02	0.07	0.03	-0.04	-0.12	0.02	0.07	0.03	-0.04	-0.12	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.654	0.37	1.09	1.1	0.81	0.74	0.37	1.09	1.1	0.81	0.74	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.527	0.32	0.99	1.22	1.61	1.92	0.32	0.99	1.22	1.61	1.92	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.325	0.82	1.31	1.2	1.2	1.22	0.82	1.31	1.2	1.2	1.22	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.151	0.5	0.65	0.56	0.6	0.64	0.5	0.65	0.56	0.6	0.64	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.017	0.8	1.24	1.39	1.6	1.73	0.8	1.24	1.39	1.6	1.73	0.00	0.00	0.00	0.00	0.00
Thomsen Slough	Mainstem	0.016	0.82	1.37	1.53	1.67	1.77	0.82	1.37	1.53	1.67	1.77	0.00	0.00	0.00	0.00	0.00

**Appendix B: Cascade Surveying Existing (Violation) and Proposed Grading Plans for Arlington Motor Inn.**



**CITY OF ARLINGTON NOTES:**

**GENERAL CONSTRUCTION NOTES:**

- ALL WORK AND MATERIALS SHALL CONFORM TO THE CURRENT EDITION OF THE CITY OF ARLINGTON PUBLIC WORKS STANDARDS AND SPECIFICATIONS, AND THE CURRENT EDITION OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION. A COPY OF THESE DOCUMENTS SHALL BE ON SITE DURING CONSTRUCTION.
- IT IS THE SOLE RESPONSIBILITY OF THE DEVELOPER/CONTRACTOR TO OBTAIN A GRADING PERMIT, RIGHT-OF-WAY PERMIT, AND UTILITY PERMITS, FROM THE CITY. ALL REQUIRED PERMITS FROM OTHER AGENCIES MUST ALSO BE OBTAINED BY THE DEVELOPER/CONTRACTOR.
- PRIOR TO ANY CONSTRUCTION ACTIVITY, THE DEVELOPER/ CONTRACTOR SHALL ATTEND A PRECONSTRUCTION CONFERENCE WITH THE CITY. THE CONTRACTOR SHALL SCHEDULE THE PRE-CONSTRUCTION CONFERENCE BY CALLING (360) 403-3500. PRIOR TO SCHEDULING, THE CONTRACTOR MUST SUBMIT AND RECEIVE APPROVAL FOR THE TRAFFIC CONTROL PLAN, CITY PERMITS, TEMPORARY EROSION AND SEDIMENT CONTROL PLAN, PERFORMANCE BOND, COPY OF OTHER AGENCY PERMITS, A COPY OF THE CONTRACTOR'S LICENSE, AND PROOF OF INSURANCE COVERAGE.
- A COPY OF THE APPROVED CONSTRUCTION PLANS MUST BE ON THE JOB SITE WHEN CONSTRUCTION IS IN PROGRESS.
- ALL SITE WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED PLANS. ANY DEVIATION FROM THE APPROVED PLANS WILL REQUIRE PRIOR APPROVAL FROM THE OWNER, THE CITY ENGINEER, AND OTHER APPROPRIATE PUBLIC AGENCIES.
- ALL OF THE LOCATIONS OF THE EXISTING UTILITIES SHOWN IN THE PLANS HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHALL THEREFORE BE CONSIDERED APPROXIMATE AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS.
- THE CONTRACTOR SHALL LOCATE AND PROTECT ALL CASTINGS AND UTILITIES DURING CONSTRUCTION AND SHALL CONTACT THE UNDERGROUND UTILITIES LOCATE SERVICE (1-800-424-5555 OR 811) AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
- INSPECTION AND ACCEPTANCE OF ALL WORK WILL BE ACCOMPLISHED BY REPRESENTATIVES OF THE CITY OF ARLINGTON. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE AND SCHEDULE APPROPRIATE INSPECTIONS, ALLOWING PROPER ADVANCE NOTICE. THE INSPECTOR MAY REQUIRE REMOVAL AND REPLACEMENT OF ITEMS THAT DO NOT MEET CITY STANDARDS OR WERE CONSTRUCTED WITHOUT INSPECTION.
- THE CONTRACTOR SHALL KEEP THE ON-SITE AND OFF-SITE STREETS CLEAN AT ALL TIMES BY CLEANING WITH A SWEEPING AND/OR VACUUM TRUCK. WASHING OF THESE STREETS WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL FROM THE CITY INSPECTOR.
- THE CONTRACTOR SHALL MAINTAIN TWO (2) SETS OF "AS-BUILT" PLANS SHOWING ALL FIELD CHANGES AND MODIFICATIONS. IMMEDIATELY AFTER CONSTRUCTION COMPLETION, THE CONTRACTOR SHALL DELIVER BOTH COPIES OF RED-LINED PLANS TO THE CITY. THE CITY WILL FORWARD ONE OF THE COPIES TO THE DESIGN ENGINEER.

**T.E.S.C.P. NOTES:**

- APPROVAL OF THE TEMPORARY EROSION/SEDIMENT CONTROL (TESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR STORM DRAINAGE DESIGN.
- A TESC PLAN MEETING THE DOE STORM WATER MANAGEMENT MANUAL ADOPTED BY THE CITY SHALL BE SUBMITTED TO THE CITY FOR APPROVAL PRIOR TO ANY WORK ON THE SITE. AN APPROVED COPY MUST BE MAINTAINED ON-SITE AND BE READILY AVAILABLE TO THE CITY INSPECTOR AT THEIR REQUEST.
- THE TESC BMP'S SHOWN ON THE PLAN MUST BE INSTALLED PRIOR TO ALL OTHER CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT-LADEN WATER DOES NOT ENTER THE DRAINAGE SYSTEM. LEAVE THE SITE, OR VIOLATE APPLICABLE WATER QUALITY STANDARDS, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THE TESC PLAN IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETE AND APPROVED BY THE CITY.
- THE BOUNDARIES OF THE CLEARING LIMITS, SHOWN ON THE TESC PLAN, SHALL BE CLEARLY FENCED OR FLAGGED IN THE FIELD PRIOR TO STARTING CONSTRUCTION. NO DISTURBANCE BEYOND THE FENCED OR FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FENCING AND/OR FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF THE CONSTRUCTION PROJECT.
- THE TESC FACILITIES SHOWN ON THE PLANS ARE THE MINIMUM REQUIREMENTS FOR THE ANTICIPATED SITE CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, THESE TESC FACILITIES SHALL BE UPGRADED AND ADDED TO AS NEEDED, FOR UNEXPECTED STORM EVENTS AND TO REFLECT CHANGED CONDITIONS, AS REQUIRED BY THE CITY.
- THE CONTRACTOR SHALL PROVIDE THE CITY A 24-HOUR EMERGENCY CONTACT PHONE NUMBER OF THE CONTRACTOR'S CERTIFIED EROSION CONTROL SUPERVISOR PRIOR TO STARTING CONSTRUCTION.
- THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE CONTINUED FUNCTION AND OPERATION.
- BETWEEN OCTOBER 1 AND APRIL 30, DISTURBED AREAS THAT ARE TO BE LEFT UNWORKED FOR MORE THAN TWO (2) DAYS SHALL BE IMMEDIATELY COVERED BY MULCH, SOD OR PLASTIC COVERING. BETWEEN MAY 1 AND SEPTEMBER 30, DISTURBED AREAS THAT ARE TO BE LEFT UNWORKED FOR MORE THAN SEVEN (7) DAYS SHALL BE IMMEDIATELY COVERED BY SEEDING OR OTHER APPROVED METHODS.
- ANY PERMANENT RETENTION/DETENTION FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES, SHALL PROVIDE ADEQUATE STORAGE CAPACITY, AND SHALL BE CLEANED OUT ENTIRELY ONCE THE SITE IS STABILIZED. IF THE PERMANENT FACILITY IS TO ULTIMATELY FUNCTION AS AN INFILTRATION SYSTEM, THE FACILITY SHALL NOT BE USED AS A TEMPORARY SETTLING BASIN.
- WHERE SEEDING FOR TEMPORARY EROSION CONTROL IS REQUIRED, FAST GERMINATING GRASSES SHALL BE APPLIED AT AN APPROXIMATE RATE OF 120 LBS PER ACRE.
- WHERE STRAW MULCH FOR TEMPORARY EROSION CONTROL IS REQUIRED, IT SHALL BE APPLIED AT A MINIMUM THICKNESS OF 3 INCHES, OR 3,000 POUNDS PER ACRE.
- SOIL STOCKPILES SHALL BE STABILIZED WITHIN 24 HOURS. WHEN ACTIVELY WORKING WITH THE SOIL STOCKPILE, STABILIZATION BY GROUND COVER BMP'S SHALL OCCUR AT THE END OF EACH WORK DAY.
- STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
- MAINTENANCE AND REPAIR OF TESC FACILITIES AND STRUCTURES SHALL BE CONDUCTED IMMEDIATELY UPON RECOGNITION OF A PROBLEM OR WHEN THE TESC MEASURES BECOME DAMAGED.
- UPON COMPLETION OF THE PROJECT, ALL BMP'S SHALL BE REMOVED FROM THE SITE AND RIGHT OF WAY. IF BMP'S ARE REQUIRED TO REMAIN IN PLACE FOR FURTHER PROTECTION, ARRANGEMENTS FOR REMOVAL SHALL BE MADE WITH THE CITY INSPECTOR.
- THE DUFF LAYER AND NATIVE TOPSOIL SHALL BE RETAINED IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICABLE. ALL AREAS SUBJECT TO CLEARING AND GRADING THAT WILL NOT BE COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STRUCTURAL FILL OR SLOPE SHALL, AT THE PROJECT COMPLETION, DEMONSTRATE THE REQUIREMENTS ESTABLISHED IN T5.13 OF THE 2014 SWMMWW, POST CONSTRUCTION SOIL QUALITY AND DEPTH.

**CITY OF ARLINGTON NOTES (CONT.):**

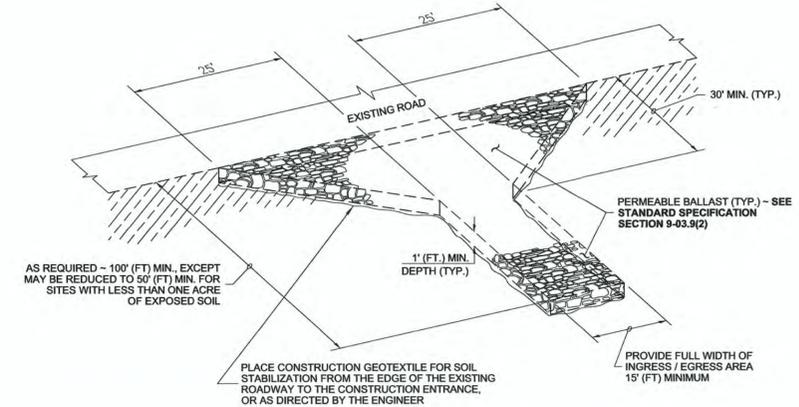
**STORM DRAINAGE NOTES:**

- ALL STORM DRAINAGE IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THESE APPROVED PLANS AND CITY STANDARDS AND SPECIFICATIONS. ANY DEVIATION FROM THESE PLANS WILL REQUIRE PRIOR APPROVAL FROM THE OWNER, THE CITY ENGINEER, AND OTHER APPROPRIATE PUBLIC AGENCIES.
- ALL PIPE MATERIALS SHALL MEET THE REQUIREMENTS OF THE CITY STANDARDS AND SPECIFICATIONS. ACCEPTABLE STORM DRAINAGE PIPE MATERIALS INCLUDE CONCRETE, PVC, HDPE, AND DUCTILE IRON. CORRUGATED METAL PIPES (GALVANIZED ALUMINUM OR STEEL) ARE NOT ACCEPTED BY THE CITY. ALL PIPE JOINTS MUST HAVE GASKETS AND SHALL BE WATER TIGHT UNLESS OTHERWISE DIRECTED BY THE CITY.
- PIPE BEDDING MATERIAL SHALL BE 5/8-INCH MINUS CRUSHED GRAVEL FOR ALL PIPE TYPES, EXCEPT DUCTILE IRON. BEDDING MATERIAL FOR DUCTILE IRON PIPE SHALL MEET THE REQUIREMENTS OF THE CITY'S STANDARDS AND SPECIFICATIONS (CHAPTER 4).
- ALL TRENCH BACKFILL IN AREAS OF PAVEMENT OR STRUCTURAL LOADING SHALL BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY. ALL OTHER AREAS SHALL BE COMPACTED TO AT LEAST 90% OF MAXIMUM DRY DENSITY.
- ALL PIPE SHALL BE PLACED ON STABLE EARTH. IF IN THE OPINION OF THE CITY INSPECTOR, THE EXISTING TRENCH FOUNDATION IS UNSATISFACTORY, THEN IT SHALL BE EXCAVATED BELOW GRADE AND BACKFILLED WITH GRAVEL BEDDING MATERIAL TO SUPPORT THE PIPE.

**CONSTRUCTION SEQUENCE :**

- SET UP AND ATTEND PRE-CONSTRUCTION MEETING.
- MARK THE CLEARING LIMITS AND INSTALL SILT FENCES.
- CONSTRUCT EROSION CONTROL & GRAVEL ENTRANCE.
- ROUGH GRADE THE SITE.
- FINAL GRADE THE SITE
- FINAL SEEDING OF ALL DISTURBED AREAS.

NOTE:  
THIS SEQUENCE IS VERY GENERAL. IT'S THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL SOILS (DISTURBED AND UNDISTURBED) ARE PROTECTED AND STABILIZED DURING ALL CONSTRUCTION PHASES, WATER RUNOFF IS CONTROLLED AND ALL TESC MEASURES MAINTAINED.

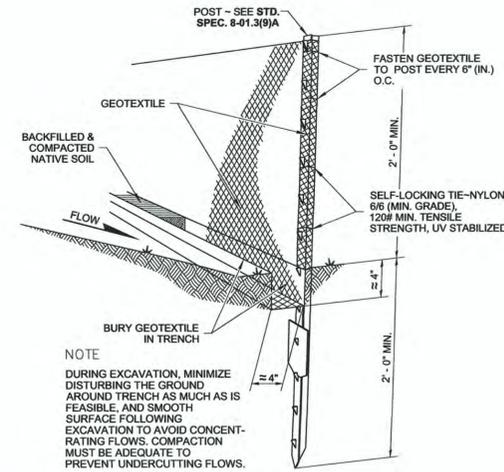


ISOMETRIC VIEW  
STABILIZED CONSTRUCTION ENTRANCE SHALL MEET THE REQUIREMENTS OF STANDARD SPECIFICATION SECTION 8-01.3(7).

WSDOT STANDARD PLAN I-80.10-02  
**STABILIZED CONSTRUCTION ENTRANCE (BMP C105)**

1  
C 1.1

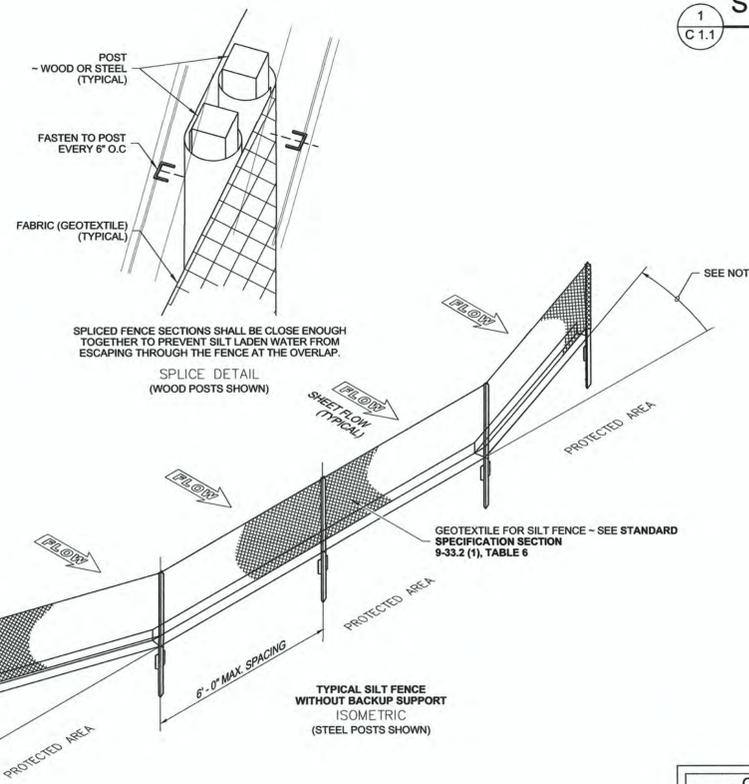
NO SCALE



TYPICAL INSTALLATION DETAIL  
(STEEL POSTS SHOWN)

**NOTES**

- Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
- Perform maintenance in accordance with **Standard Specifications 8-01.3(9)A and 8-01.3(15)**.
- Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
- Install silt fencing parallel to mapped contour lines.



WSDOT STANDARD PLAN I-30.15-02  
**SILT FENCE DETAIL (BMP C233)**

2  
C 1.1

NO SCALE

CALL TWO  
BUSINESS DAYS  
BEFORE YOU DIG  
1-800-424-5555

**CONSTRUCTION DRAWING APPROVAL**

THIS SHEET HAS BEEN REVIEWED AND APPROVED PER THE CONDITIONS ON THE TITLE SHEET.

BY: \_\_\_\_\_  
CITY ENGINEER, CITY OF ARLINGTON

DATE: \_\_\_\_\_  
THIS APPROVAL VALID FOR 18 MONTHS

**CASCADE SURVEYING & ENGINEERING, INC.**  
Planners Engineers Surveyors  
P.O. BOX 376  
ARLINGTON, WASHINGTON 98223  
WWW.CASCADESURVEYING.COM  
FAX: (360) 435-4012  
1-800-583-5551  
(360) 435-5551



NO.	REVISION	DATE	BY

DESIGNED	KB	DATE	02/20
DRAWN	TAA	DATE	02/20
CHECKED	RJD	DATE	02/20
FIELD BOOK	SN	954	REF.

**ARLINGTON MOTOR INN**  
310508000302000  
**GENERAL NOTES & DETAILS**  
CITY OF ARLINGTON  
FILE NO.:

**C 1.1**  
**22365**



PORTION OF NW 1/4, SW 1/4 OF SEC. 8, TWP. 31 N., RGE. 05 E., W.M.



GRAPHIC SCALE

BASIS OF BEARINGS: SURVEY AFN 200006065002

DATUM: NAVD 88

TBM 954-71-1  
 SET N. BOLT TOP FLANGE HYDRANT  
 AT SE CORNER DENNY'S PARKING LOT  
 ELEV.= 49.56'

CONTOURS ESTABLISHED FROM FIELD  
 MEASUREMENTS. BY CASCADE SURVEYING &  
 ENGINEERING, INC. IN 2020.

BOUNDARY ESTABLISHED PER RECORD OF  
 SURVEY AFN 200006065002 & 8604155002.

ELEVATIONS ESTABLISHED BY RTN GPS  
 OBSERVATIONS WITH CORRECTIONS FROM W.S.R.N.

- LEGEND:**
- 80 --- EXISTING CONTOURS
  - PROPERTY LINE
  - SECTION LINE
  - ADJACENT PROPERTY LINE
  - EXISTING RIGHT OF WAY CENTERLINE
  - EXISTING EDGE OF GRADING
  - TOP OF SLOPE
  - FOUND PROPERTY CORNER (AS NOTED)

**VIOLATION DESCRIPTION:**  
 APPROXIMATELY 1,325 CU. YD. OF MATERIAL REMOVED  
 AND PLACED ON NORTH PARCEL #31050800302000

**CALL TWO  
 BUSINESS DAYS  
 BEFORE YOU DIG  
 1-800-424-5555**

**CONSTRUCTION DRAWING APPROVAL**

THIS SHEET HAS BEEN REVIEWED AND APPROVED  
 PER THE CONDITIONS ON THE TITLE SHEET.

BY: \_\_\_\_\_  
 CITY ENGINEER, CITY OF ARLINGTON

DATE: \_\_\_\_\_  
 THIS APPROVAL VALID FOR 18 MONTHS

**CASCADE  
 ENGINEERS &  
 SURVEYORS, INC.**

Engineers  
 Surveyors  
 Planners

P.O. BOX 396  
 ARLINGTON, WASHINGTON 98223  
 WWW.CASCADESURVEYING.COM  
 FAX: (509) 335-4912  
 1-800-563-5551  
 (360) 435-5551

REVISION	DATE   BY

DESIGNED	KB	DATE	02/20
DRAWN	TAA	DATE	02/20
CHECKED	RLD	DATE	02/20
FIELD BOOK	SN	954	REF.

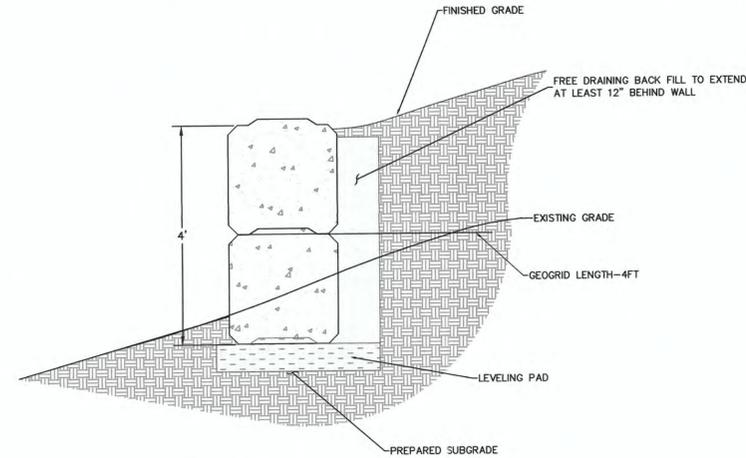
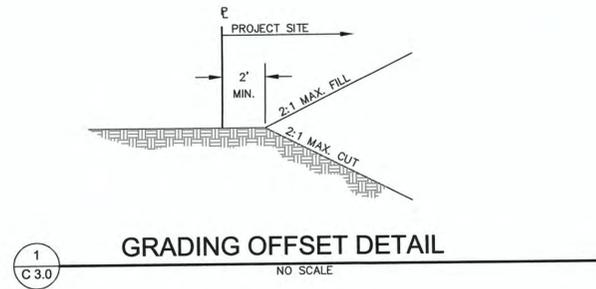
**ARLINGTON MOTOR INN**  
 31050800302000  
**GRADING VIOLATION**  
 (2020 EXISTING CONDITIONS)  
 CITY OF ARLINGTON  
 FILE NO.:

**C 1.3**  
**22365**

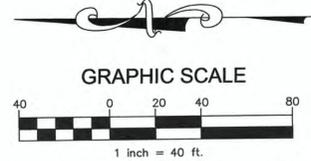




PORTION OF NW 1/4, SW 1/4 OF SEC. 8, TWP. 31 N., RGE. 05 E., W.M.



2 C 3.0  
GEOBLOCK RETAINING WALL  
NO SCALE



BASIS OF BEARINGS: SURVEY AFN 200006065002

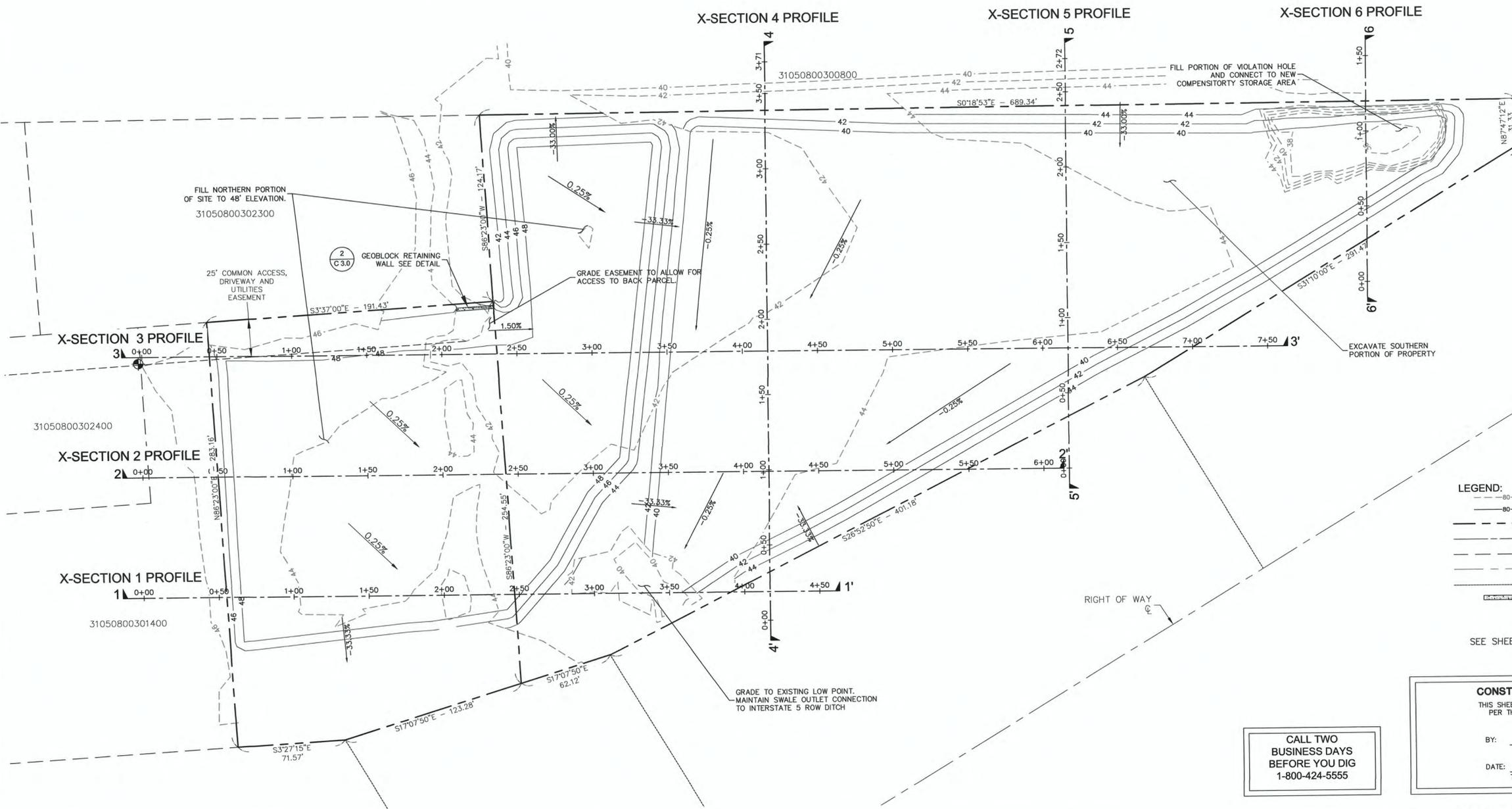
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BOUNDARY ESTABLISHED PER RECORD OF SURVEY AFN 200006065002 & 8604155002.

ELEVATIONS ESTABLISHED BY RTN GPS OBSERVATIONS WITH CORRECTIONS FROM W.S.R.N.

**CASCADE SURVEYING & ENGINEERING, INC.**  
 Engineers Surveyors Planners  
 P.O. BOX 326  
 ARLINGTON, WASHINGTON 98223  
 WWW.CASCADESURVEYING.COM  
 (360) 435-6551  
 (360) 435-6551



**LEGEND:**

	EXISTING CONTOURS
	FINISH CONTOURS
	PROPERTY LINE
	SECTION LINE
	ADJACENT PROPERTY LINE
	EXISTING RIGHT OF WAY CENTERLINE
	EXISTING EDGE OF GRADING
	GEOBLOCK RETAINING WALL

SEE SHEET C 3.1 FOR GRADING PROFILES.

CALL TWO BUSINESS DAYS BEFORE YOU DIG  
 1-800-424-5555

**CONSTRUCTION DRAWING APPROVAL**  
 THIS SHEET HAS BEEN REVIEWED AND APPROVED PER THE CONDITIONS ON THE TITLE SHEET.

BY: \_\_\_\_\_  
 CITY ENGINEER, CITY OF ARLINGTON

DATE: \_\_\_\_\_  
 THIS APPROVAL VALID FOR 18 MONTHS

REVISION	DATE	BY

DESIGNED	DATE 02/20
DRAWN	TAA DATE 02/20
CHECKED	RLD DATE 02/20
FIELD BOOK	SN 954 REF:

**ARLINGTON MOTOR INN**  
 31050800302000  
**GRADING PLAN**  
 CITY OF ARLINGTON

FILE NO.:

C 3.0  
 22365